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TRANSACTIONS

OF THE

Massachusetts Horticultural Society,

FOR THE YEAR 1885.

PART I.

BOSTON:
PRINTED FOR THE SOCIETY.
1885.

The following papers and discussions have been circulated to some extent in the form of slips reprinted from the reports made by the Secretary of the Society in the Boston Transcript. As here presented, the papers are printed in full, and the discussions are not only much fuller than in the weekly reports, but, where it appeared necessary, have been carefully revised by the speakers.

The Committee on Publication and Discussion take this opportunity to repeat what they have before stated, that the Society is not to be held responsible for the certainty of the statements, the correctness of the opinions, or the accuracy of the nomenclature in the papers and discussions now or heretofore published, all of which must rest on the credit or judgment of the respective writers or speakers, the Society undertaking only to present these papers and discussions, or the substance of them, correctly.

O. B. Hadwen,
William H. Hunt,
Francis H. Appleton,
Committee on Publication and Discussion.

TRANSACTIONS

OF THE

Massachusetts Horticultural Society.

BUSINESS MEETING.

SATURDAY, January 3, 1885.

A duly notified stated meeting of the Society was holden at 11 o'clock, the President, JOHN B. MOORE, in the chair.

The President delivered his annual address, as follows: —

ADDRESS OF PRESIDENT MOORE.

Ladies and Gentlemen of the Massachusetts Horticultural Society: —

Again we have assembled here to commence anew our work, and also to look back upon the past and to profit by its teachings. The last has been an eventful year in the history of this Society, and the first in which the death of a President has occurred.

Hon. Francis B. Hayes, then in the full vigor of mature manhood, was, on the 20th of September, suddenly called from his earthly duties to a higher life. Mr. Hayes, as President, served this Society well; he was attentive, energetic, and vigilant in the performance of his duties; a good financier, an excellent presiding officer, urbane in manner, and courteous to all. He was an enthusiastic lover of trees, plants, and flowers, and of everything pertaining to rural life; and constantly interested in acquiring information upon horticulture from books, as evinced by his use of our library, as well as of his own.

His country home, at Lexington, under his lavish expenditures and extensive improvements both in buildings and grounds, was fast becoming one of the notable estates in the suburbs of Boston.

The large and frequent contributions from his gardens of flowers, fruits, and vegetables have added much interest to our exhibitions. By his death this Society has met with a great loss. His funeral was attended by many of our members, who followed the body to its resting-place in Mount Auburn, that beautiful garden of the dead established by this Society many years ago.

This Society has always been proud of the record of its founders; them, and those other members of our Society, true friends of horticulture, who have passed away, we remember with gratitude. They commenced a noble work, which we, who have had the benefits of their experience and example, are to continue. It is in the nature of a trust, which we are bound in honor to improve for the benefit of those who come after us.

At the same time let us not forget the debt of gratitude which we owe to the living — to our venerable Ex-President Wilder, who has devoted a long life to the advancement of the science and the practical development of horticulture, and who still, in his green old age, is as anxious for new horticultural products and methods of cultivation as a young beginner. To the other Ex-Presidents, and to many members who have aided the Society in its progress, — to the tried friends of this institution, who have so often assisted in making our exhibitions attractive, by sending to our halls rare and beautiful plants from their conservatories, and who by other substantial aid afforded to our Society have done so much for the encouragement of horticulture, — to all of these we owe a debt of gratitude.

The awarding committees report that the weekly shows have been larger, better, and more fully atténded than usual.

The four large shows, at which the public have been charged a small admission fee, have, under the prudent management of the Committee of Arrangements, who have had them in full charge, proved more successful than usual, not only in the quantity and quality of the exhibits, but also in the receipts for admission, which were much larger than in previous years.

The public appreciation of the beauty of our exhibitions is yearly growing; and, as the taste for beautiful flowers and fine fruit increases, so will the desire to attend our exhibitions become greater every year, until instead of hundreds there may be, in the near future, thousands to crowd our halls.

The amount of money appropriated for prizes, for the year 1884, was $3,450; this has been increased to $5,100 for the year 1885.

A policy of liberal premiums, so far as may be warranted by a prudent regard for the condition of the Society's finances, is the true course to adopt to secure the most successful exhibitions.

With this liberal inducement in the increase of premiums, let our cultivators of flowers, fruits, and vegetables remember that soon this cold winter will have passed and spring will have come; let us all be prepared in time to take full advantage of the seasons, and bring to our halls the rarest and best products of our skill, and, by such united efforts on the part of all, make our displays better than any we have ever had. And let each of our members realize the importance of his individual contribution; for it is their aggregated aid that makes our large displays.

We have, so far as horticulture is concerned, one of the most extensive and best libraries in this country. The privilege of its use is of much more value to any person seeking information in regard to plants, fruits, flowers, and vegetables, than the cost of membership in the Society; and those who love rural life, who admire plants and flowers for their beauty, who desire to grow the luscious fruits which ripen so well under our bright sunshine, who look with wonder and respect upon the noble trees that adorn our streets and pleasure grounds, many of them of much more than a century's duration, can well consult the books on these shelves for information as to what, when, and how to plant to produce the most favorable results.

But, though we have one of the best libraries, I could wish that the accommodations for the books were more commensurate with their value. The Chairman of the Committee on the Library, in his report, again asks for more room for the large accumulation of books for which we have no adequate provision, and suggests, as a remedy for this, that we build a gallery around this room, fitted with cases. By the report of the Secretary and Librarian we are informed that there have been added to the library, since the year 1878, 1,400 books and 750 pamphlets, many of them rare and of great value. Some books of the least value are stored in other rooms in this building, and many of the shelves in the book cases in this room contain double rows of books. This is an important matter, and the request of the Library Committee should be considered and prompt action taken.

The Secretary, who is also Librarian, has attended to his duties in that careful and correct manner for which he is noted. Frequent calls upon his time for information relating to the library, identifi-

cation of fruits and botanical specimens, and a multitude of other points, prevent his getting the Society's TRANSACTIONS in print as soon as would be desirable, and for that reason it would appear to be proper to furnish him some assistance.

The papers and discussions before our Society have increased in interest very much in the last few years, with a good prospect of their being still better the present season. The information brought out at these meetings adds very much to the worth of our TRANSACTIONS, and is much sought for by the public. To make these meetings as useful as possible every member should contribute all the aid in his power.

The Treasurer not having settled with the Mount Auburn Cemetery Corporation will be unable to make his report today. He is also Superintendent of the Building, which he has managed carefully and economically, and he is entitled to credit therefor.

The awarding committees of our Society have performed their duties in a prompt and faithful manner, and have given good satisfaction the past year. The Committee of Arrangements have performed their duties well, and shown good taste and excellent judgment in the management of the four large exhibitions, which thereby have resulted in greater pecuniary advantage than usual to the Society.

In many of the States of the Union horticultural societies are directly encouraged by grants of money, or by the printing, at the expense of the State, of large editions of their transactions for public distribution; the youthful State of Kansas having in each of the years 1882 and 1883 appropriated $4,500 in aid of the State Horticultural Society. Considering the large amount of money awarded by our Society in premiums, it would appear a fair question whether it is not entitled to State bounty for that purpose, to the same amount, and on the same conditions, as it is given to the agricultural societies of the State. I therefore recommend to the Society an early consideration of this matter.

On motion of C. H. B. Breck, the thanks of the Society were presented to President Moore for his address, and it was referred to the Executive Committee to consider the recommendations contained in it.

The President, as Chairman of the Executive Committee, reported the reappointment by that Committee of Robert Manning,

as Secretary and Librarian, and George W. Fowle, as Treasurer of the Society and Superintendent of the Building, for the year 1885.

The appropriations recommended by the Executive Committee, on the 1st of November and the 6th of December, 1884, came up for final action, and were voted by the Society, as follows: —

For Prizes and Gratuities, —	
For Plants and Flowers	$2,500
For Gratuities for the encouragement of the exhibition of flowers during the winter months . .	100
For Fruits	1,500
For Vegetables	800
For Gardens	200
	$5,100

For the Committee on the Library, for the purchase of Books and Periodicals, Binding of Books, and Incidental Expenses of the Committee . . .	$300
For continuing the Card Catalogue of Plates . .	100
For the Committee on Publication and Discussion .	200
For the expenses of the Committee of Arrangements,	300

C. H. B. Breck announced the decease, on the 10th of December, of Francis Lyman Winship, for many years Recording Secretary of the Society, and moved the appointment of a committee to prepare memorial resolutions. The motion was carried, and the Chair appointed Mr. Breck, William J. Underwood, and John C. Hovey, as that committee.

Arthur W. Blake, of Brookline, was proposed by Hon. Marshall P. Wilder, as a Life Member of the Society.

John L. Gardner, of Boston, and
Miss Annie C. Putnam, of Boston,

having been recommended by the Executive Committee, were, on ballot, duly elected members of the Society.

Joseph H. Woodford moved that the Society appropriate a sum not exceeding $20, to supply the deficiency in the subscription for

silver vases for prizes for roses, at the Rose Exhibition in June last. The motion was referred to the Executive Committee.

Adjourned to Saturday, January 10.

MEETING FOR DISCUSSION.

The Climate and Horticulture of New England.

By John E. Russell, Leicester.

Mr. President, Gentlemen and Ladies:—

This sharp January day, with hard, deep-frozen ground and threats of lower temperature, is not unseasonable in our climate, nor does it interfere with the work of the members of our Society. It allows time for the winter meetings; and I thank you for honoring me with an invitation to address this the initial gathering of the year. Let me, sir, congratulate the Society upon the good work of the last year. I rejoice to know that our membership is enlarged, our influence spreading, our exhibitions so zealously maintained and so well attended, and our treasury in such a satisfactory condition.

At this opening meeting, a few remarks upon the climate of our region and the history of our horticulture may not be out of place.

To the horticulturist climate is a topic of ever-present interest. Like our English cousins we are always growling about it, and whenever at loss for conversation we "resume the weather." I have often thought, in the midst of one of our terrible winters which so try the courage and irritate the nerves, that our hard New England was too inhospitable to be the habitation of man. At this gloomy period I have yearned, as those who wait for the morning, for the miracles of spring, so vivid upon these Northern shores, and for the beauties of June, the crown and glory of the New England year.

In my wide experience, whether under the rosy light reflected by the tideless Mediterranean, or where the great swell of the Pacific breaks upon shores whose verdure never fails, and tropic islands the glory of whose fronded palms delights the voyager from afar, I have experienced no such sensation of joy as comes with our delicious June. It is a new heaven and a new earth, making good to us the doctrine of compensation, and purging our minds of all unhappy recollections of winter. But it is so short!

It was in the early summer of their first experience that Edward

Winslow, Governor of Plymouth Colony, wrote to England with enthusiasm of the climate and the flora, the vines, sweet with their delicious perfume, the wild "damsons," and the forest roses, and the richness of the sea-food.

No doubt he expected that June would last until December. He had yet to learn of the power of the midsummer sun, and the parching droughts that were to threaten the very existence of the colonists. His clusters of thick-skinned, foxy grapes have surely set the children's teeth on edge; his acrid damsons have disappeared from our sylva; and the treasures of food hidden in the sea-sands chiefly serve to vary our sustenance during the season of clams.

A true descendant of the Pilgrims, the eloquent Rufus Choate, said: "Take the climate of New England in summer, hot today, cold to-morrow, mercury at eighty degrees in the shade in the morning, with a sultry wind south-west. In three hours more a sea-turn, wind at east, a thick fog from the bottom of the ocean, and a fall of forty degrees. Now so dry as to kill all the beans in New Hampshire, then floods carrying off all the dams and bridges on the Penobscot and the Androscoggin; snow in Portsmouth in July, and the next day a man and a yoke of oxen killed by lightning in Rhode Island. You would think the world was coming to an end. But we go along. Seed-time and harvest never fail. We have the early and the latter rains; the sixty days of hot corn weather are pretty sure to be measured out to us; the Indian summer, with its bland south winds and mitigated sunshine, brings all up, and about the 25th of November, being Thursday, a grateful people gather about the Thanksgiving board, with hearts full of gratitude for the blessings that have been vouchsafed to them."

There is a popular belief that rough and inclement climates are the especial nurses of the spirit of independence; hence the heroic lines, always quoted in the after-dinner speeches of our friends from New Hampshire: —

> "Man is the nobler growth our realms supply,
> And souls are ripened in our Northern sky."

But is it not true in history that the barren and inhospitable regions have been saved from enslaving conquest by their lack of attraction to the conqueror?

In Gibbon's first volume it is related that Scotland did not feel the yoke of imperial Rome because of her rough climate. The

native Caledonians were indebted for their independence rather to their poverty than to their valor. "The masters of the fairest and wealthiest climates of the globe turned with contempt from gloomy hills assailed by the winter's tempests, from lakes concealed in blue mists, and from cold and lonely heaths over which the deer of the forest were chased by troops of naked barbarians." The boasted liberty of the Swiss has been due to the inaccessible and repellent nature of their glacier-clad Alps, while the sunny slopes of Italy have been the scenes of war and rapine.

> "Italia! O Italia! hapless thou
> Who didst the fatal gift of beauty gain;
> A dowry fraught with never-ending pain,
> A seal of sorrow stamped upon thy brow!"

The great calamities that came upon mankind early in our era, when the civilization of the world was overwhelmed by barbarians, were caused by the armed immigration of the Northern races seeking a better country. They came not as armies, but as moving peoples. They had with them all that they loved and all that they possessed: their Dacian women, their young barbarians, their troops of Scythian cavalry, their herds of coarse, rough-haired cattle; their homes were where they encamped. They left their Arctic allegiance behind; they exchanged with gladness the waters of the Don and the Volga, murmuring under imprisoning ice, for the sunny slopes of the Arno, the Rhone, and the Guadalquivir. They left the gloom of Northern forests, the dark shadows of fir and birch, for the fruitful groves and vineyards of Italy.

The causes of the emigration that commenced a settlement upon the stern coasts of Massachusetts at the beginning of winter, when December winds howled through the forest and tossed the freezing foam upon the rocks, were not similar to those I have described.

> "No lure of conquest's meteor beam,
> Nor dazzling mines of fancy's dream,
> Nor wild adventure's love to roam,
> Brought from their fathers' ancient home,
> O'er the wide sea, the Pilgrim host!"

A thirst for freedom of the soul, freedom of thought, and a larger measure of freedom of life, — a desire that two centuries had been kindling, and which had to be satisfied, — led to the reckless

attempt which, pursued with so much of suffering, destitution, and misery, almost perished in the New England wilderness during that first winter, but which *did* live to found a colony and a nation. They took no thought of climate, — they lived but to die, — their vision looked beyond the dreary shore of Plymouth to that perfect climate,

> "Where everlasting spring abides,
> And never withering flowers;"

and they bore without complaint, but with much home-sickness, the fierce extremes of their new home. There is no record by thermometer of the first hundred years of the occupation of New England, as this simple and necessary instrument was not made practically available until the beginning of the eighteenth century, so that we have no knowledge of the degree of heat they experienced, but we do know from their records that in one respect the climate has changed but slightly since then, — that *drought* was an ever-present menace to the struggling colonists. The experience of their earliest planting also shows that unacclimated English plants could not bear the fervor of our sun; for, of the six acres of barley and peas put in, not only with faith, hope, and prayer, after the Christian manner, but, as a precautionary measure, well manured with fish, after the heathen Indian style, the barley was indifferent good, and the peas not worth gathering; they came up well and blossomed, but the sun parched them in the blossom, and the hope of the Pilgrim husbandman was frustrated. Their first summer was undoubtedly very early, for they began tillage in March, and it was very hot.

Subsequent seasons were later, and the English garden seeds yielded abundantly; for we have the enthusiastic testimony of the Rev. Francis Higginson, who, in 1629, wrote, "Our Governor hath store of green pease growing in his garden, as good as I ever eat in England. Our turnips, parsnips, and carrots are bigger and sweeter than is ordinary to be found in England; here are store of pompions, cowcumbers and other things of that nature which I know not."

Probably there has been little change in the climate; the forest was not so all-pervading as writers have usually assumed, — there was much clear land, and the Indians burned over great tracts, the fires running until material was exhausted, or rains quenched the flames. Now, as then, winter prevails the greater part of the

year. Early in September the gardener expects frost; later in the month the low lands are hoar with rime. October, with bland, charming days, has a killing night breath. November ends even the show of vegetable life, and thenceforward, "a leafless branch his sceptre, winter rules the inverted year."

Though we have our open and mild winters at long intervals, the mean temperature is below 32°, with frequent sudden ranges below zero. In this period of intense cold, the streams are locked in thick-ribbed ice; the ground, often bare of snow for weeks, freezes to a depth of three or four feet; there is no sign of life in herbaceous plants, and the loosened winds howl o'er the pendent globe. Nor does the scene assume the beauty that belongs to vegetable growth until late in the spring; usually "Winter lingering chills the lap of May." Summer comes with June, and though it has been asked, "What is so *raw* as a day in *June?*" — from the advent of our divine month there will be one-quarter of the year without frost; nature is often yet more benignant, and we have four months of warm weather.

With this climate we have a thin, hard, stony soil; the few plants necessary for the support of man (for of the thousands known to botany he uses scarcely a hundred) perish in winter, and must be continually renewed from seed, or by the preservation of their roots, bulbs, or tubers.

Our summer, though all too brief, is hotter than in the tropical or equatorial region of our continent, and favorable to the growth of any plant that will mature within ninety days. Plants of warm regions that, introduced here, endure the inclemency of the winter, we call "hardy," and adopt them into our flora.

Science has labored in vain to determine why one plant endures severe cold without harm, and another withers and perishes. An inhabitant of the tropical world, stumbling over the rocks firm set in the frozen surface of a Massachusetts pasture, or floundering in the snow-drifts of a swamp darkened by hemlock boughs, and gaunt with the bare limbs of birch trees, would start with amazement to see the glossy, dark leaves of evergreen kalmia or rhododendron, so like the tropical foliage of lemon, orange, or cacao. If he cuts the wood, he finds it, like them, hard and fine of grain; the imperceptible, unexplained difference in character being in the power to live through the winter. This remarkable difference is also noticed in bulbs and tubers; but as yet unaccounted for.

Our cold winter does not exempt us from the introduction of

pestilent weeds that are by nature hardy and cosmopolitan, and that, taking advantage of the exchanges of agriculture, travel about the globe, unbidden guests, with such vigorous aggression that their extermination, in our methods of culture, seems impossible.

Our fervent ninety days of summer, though not enough for the great majority of tropical plants, enable us to make gardens that in edible richness surpass the prodigality of the tropical world; albeit the plants which we there produce, — that minister so much to health, comfort, luxury, or actual necessity, — have been introduced to our use from the far South.

The vegetable contributions of the New World to the Old were from the regions of tropic warmth. The maize, or Indian corn, though spread by savage necessity to the extreme limit of cultivation at the time of the discovery of America, was a child of the sun. Tobacco, the ubiquitous solace of life; the potato, that has enabled the world to sustain its population so easily; the tomato, chocolate, quinine, and an infinite variety of tropical flowers, were furnished from the boundless resources of the equatorial world. Imagine a pharmacopœia without quinine, — a malaria-infected world without its remedy, — people whose *un*embittered existence should be shaken and racked with chills and fever, and no antidote!

When our fathers landed upon the shores of Plymouth they could form no idea of the flora of the region. Those who lived to see the miracles of the New England spring were filled with glad surprise at its sudden beauty. They gathered with delight, first, the lovely arbutus; later, the pale, single roses of the forest. When the wild grapes blossomed, charming the vagrant breezes with fragrance, and their broad leaves unfolded, they knew why the Norseman, skirting these shores in summer, had called it a Land of Vines. Then they reddened their fingers with the wild strawberries, and told thumping stories about them in letters home, — travellers' tales, such as, that "ships might be loaded with their abundance."

It is necessary for man to plant seed and till the soil, even in savage life. I take it that the New England Indians were no mean farmers, and that their agriculture was quite extensive. The Pilgrim watched the squaw preparing the ground cleared by fire upon the banks of a stream; her simple hoe, a clam shell or shoulder blade of deer, tied with thong of hide or muscle to a stick. They worked their land near the water, to be convenient

to the great store of herring or shad, and in the mellowed earth they put one or more fish, and dropped the golden grain of maize; the Pilgrim saw its blades of tender green seek the light and shoot upward with tropical vigor, color, and form. The grass grains of the Old World, waving in billowy richness, were the types they knew. Wheat, rye, and barley, ancient as our race, and making the staff that has supported the toiling steps of every generation of men, were familiar to them. What must have been their surprise when they saw this child of savage horticulture respond to the ardent kisses of the sun, spread its broad leaves, exalt its towering blossom, shed its fertilizing pollen, and ripen its prodigal grain!

It was their wonder and their safety; it was God's gift and mercy that by it, upon these rugged shores, they might live, and that the wandering witness of his word should be preserved and established, — a proof of his lasting love and watchful power.

This bantling of the Indian squaw is now the king of all the cereals; whose field is a continent, and whose surplus loads the boards of nations that would otherwise perish. This very season the American farmers have raised in ninety days eighteen hundred millions of bushels upon lands that stretch from the sandy shores of Plymouth to the gate of the Pacific, and from where the cool streams leap to the untempered waters of the North Atlantic to the turbid tide of mighty rivers dark rolling to the Southern Gulf.

The maize was the only useful plant of the family of grasses that the English settlers found in their new home. The tame grasses of Europe that now wave in our meadows, the cereals, roots, and fruits of civilized life, had to be carefully introduced, supported, and cultivated, to form the wide basis of our present agriculture and horticulture.

The native flora of New England was not sufficient for the support of man. There was game in the forest, and fish in the streams and waters of the coast; but timber, ice, and rocks were the sole productions of the shore. May I not say that there was not a wild plant of all our region that has ever been cultivated into value, from the time of its discovery until now? It may perhaps be proper to except several small fruits, and also to speak of the sugar maple, one of the most beautiful of our native trees, readily transplanted or raised from seed. It is of vigorous growth, its foliage clean and rich in summer, and when ripened in autumn gorgeous in varied colors. While yet the snow-drifts lie heavy in the wood,

before the blue-bird — harbinger of spring — is heard, it may be tapped, and its sap, identical in composition with the juice of tropic cane, produces a peculiar sugar well known to us all. I have tasted it when sent to me in foreign lands, and its wild flavor has so brought back the odor of the forests of my native hills, that, sick for home, I have stood in tears upon the alien strand.

The natural emigration of plants is to kindlier soils, or to those climates that offer favorable conditions of growth. The most remarkable case of emigration is that attributed to the Cocoa Palm. Its original country is supposed to be Ceylon, where, on the coast of Colombo, there are vast groves, scarcely interrupted by other trees. These forests of palm are of immemorial antiquity; from this, or from the similar coast of Malabar, the great nut, falling into the water, is borne on the currents of the Pacific. Its germ of life and the albuminous matter within are protected by its rough shell; it may float for months, perhaps for years, until washed by the surf upon the sand of a coral island; here it sinks into the sand — in darkness, moisture, and heat; it swells, sprouts, and grows; the albumen of the inner shell nourishes the root; it begins as a single leaf, and at length it stands a mighty column, taller than the mast of a great admiral, bearing aloft the glory of its leaves and its centre of continuous flowers, the crowned monarch of the vegetable kingdom. Thus has the palm been distributed to all parts of the tropical world reached by the currents of the ocean.

Seeds that are winged are carried by the wind, that bloweth where it listeth; others are disseminated by birds. Some attach themselves to the hair or fur of animals, and so move about the world. We cannot tell why, when we cut off a forest of pines, oaks spring in their place; or why, from fallow lands, a forest of walnut should be evolved as from the inner consciousness of the earth. Our Massachusetts soil probably received all its share of plants that would survive upon it; it was kind to a rich variety of arborescent species, its flora containing a larger number than any other region of similar extent in the north temperate zone. The Appalachian flora, in which ours is included, has in a comparatively small area twice as many species of trees as grow naturally in all the Continent of Europe; but if the cocoa-nuts floated on ocean currents reached our chilly shores, they never remained over winter. Our fathers soon found that the earth yielded its increase only to the hand of toil, and set themselves early to the great

work not only of planting a nation in the wilderness but also of providing food for its maintenance.

At this time grasses were not cultivated in England, and the wild herbage served here, as in the British Islands, for the cattle that were imported in considerable numbers shortly after the settlement of Plymouth. Wheat, rye, barley, beans, carrots, parsnips, and turnips were soon introduced, and added to the corn, squashes, and tobacco of Indian agriculture; so that in 1629 planting and gardening became the boast of the colonists, who wrote back to England: "Wee abound with such things as, next under God, doe make us subsist; sundrie sorts of fruits, as musk-millions, water-millions, Indian pompions, and many other odde fruits that I cannot name."

Later botanical investigation revealed further natural richness without "the art or helpe of man," in the existence of "Purselane, Sorrell, Peneriall, Yarrow, Mirtle, Saxafarilla," and though, in their boasting, they would have included the nauseous chokecherry as yielding clusters of cherries like grapes, they confess that the acrid juice did so "furre the mouth that the tongue did cleave to the roof thereof, and the throat wax hoarse with swallowing them." Their idea was, in such cases, to tame the fruit, which was wilder than the Indian himself, and in this direction we see the best effort of the horticulturist.

The slow process of pomology began when Governor Winthrop planted the seeds of Pippins on an island of Boston harbor, which grew, and gladdened the sight of the Puritan with blossoms that Eden knew, and in 1639 on the 10th of October, there were ten fair pippins, fruit of that seed, "there not being one apple or pear tree planted in any part of America except on that island." The next year Governor Endicott commenced a nursery of seedling trees at Salem, and, trees being scarce, and land plenty, he exchanged trees for land, — two young trees for an acre. Peregrine White, himself the earliest fruit of Plymouth shore, planted apples, and indeed the whole colony was fully alive to the importance of apples. Quantity was desired rather than quality, the purpose of planting so largely being to make "Syder," to which our pious ancestors were greatly addicted.

The desire of the Puritan, distant from help and struggling for bare existence, to add the Pippin to his slender list of comforts, and the sour "syder" to cheer his heart and jog his liver, must be considered a fortunate circumstance. Perhaps he inclined to cider

for the same reason that the Chaplain of Newgate, in Jonathan Wild's time, gave for his love for rum punch, — "because it was nowhere spoken against in the Scriptures." He found a new home for the most useful fruit that has been given to man, and a soil and climate that have improved its quality and increased its value beyond any possible expectation of the earlier cultivators. Pears were not neglected: the trees of common, heavy bearing varieties grew to great size in large orchards, the fruit being made into perry, — another species of "red-eye," now happily forgotten. It may be noted that the canker-worm was waiting for the advent of the apple, and the curculio was in ambush for the plum.

This cider interest may perhaps explain the fact that no nurseries of improved grafted fruit were established in New England until our time. The seedling trees must have grown with great rapidity and produced enormously, trees making seven to nine barrels of cider being common in all orchards. Villages of forty to fifty families made from two to three thousand barrels of cider; every cellar was full of it; it was drunk, sold, given away, and there were "woes and babblings" in consequence.

On Long Island, the Linnæan Botanic Garden of the Prince family, at Flushing, was commenced in the middle of the last century. Here were splendid collections of foreign and native fruit and ornamental trees. There were other nurseries on the island; also in New Jersey, Pennsylvania, and South Carolina, and gentlemen of this neighborhood had to send there, or to England, for trees. In 1822, John Lowell, writing in the "Massachusetts Agricultural Repository," vol. vii, p. 137, said: "We are utterly destitute in New England of nurseries for fruit trees on an extensive scale. We have no cultivators upon whom we can call for a supply of the most common plants of the smaller fruits, no place to which we can go for plants to ornament our grounds. We have not a single seedsman who can furnish us with seeds of annual flowers upon which we can put reliance." A year later he wrote in the same journal complaining that, "A traveller may traverse Massachusetts from Boston to Albany and not be able to procure a plate of fruit, — except wild strawberries, blackberries, and whortleberries, — unless from the hospitality of private gentlemen."

The Massachusetts Society for Promoting Agriculture had been established in 1792, by wise, public-spirited, generous gentlemen. It became a beneficent institution, and still flourishes in a youth that I trust may be immortal. The value of its assistance to the

general agriculture of the Commonwealth cannot be over-rated, and it is always on the alert to give practical assistance to the farmer.

In 1801 this Society gave $500 for the establishment of a professorship of Natural History at Cambridge, and a committee was appointed to procure subscriptions for its permanent endowment. This resulted in the establishment of the Botanic Garden connected with the University, and was one of the causes that led to the formation of the Massachusetts Horticultural Society in 1829. From this time the pursuits of gardening and pomology took their rise, — evidences of increasing taste and a more refined civilization.

"The garden," said Lord Bacon, "is the purest of human pleasures; it is the greatest refreshment to the mind of man, without which buildings and palaces are but gross handiworks; and man shall ever see that when ages grow to civility and elegancy, men come to build stately, sooner than to garden finely, as if gardening were the greater perfection." It is a pursuit alike adapted to either sex; it is the relaxation of genius, a refuge from the toil of commerce and the cares of state.

Think what it adds to the refinement and luxury of life. Look back in the records of fifty years, or examine the recollection of each one here present, and see how small and poor was the list of fruits and their varieties; and those were confined to the gardens of the wealthy. Now I may say that, in my annual visits to the agricultural fairs, I see, each year, in remote towns of the Commonwealth, exhibitions of fruit and flowers such as the whole nation could not have made in my boyhood.

The grape — the type of luscious fruits, the inspiration of poetry, the adornment of eloquence — is but of yesterday in our cultivation. It is but about sixty years since valuable American varieties were first brought into notice; now we have numerous seedlings and hybrids brought into our market by the ton from our own vineyards, and sold as cheaply by weight as apples.

About the same time that this work began the berries were confined to the wild varieties of the woods and the fields. We have only to go back to 1839 to find on the record that then was first exhibited the Hovey's Seedling strawberry, which so stimulated the emulation of gardeners; and the splendid variety originated by President Wilder, with its surpassing flavor, was not given to the world until 1865. Now the list of that noble family is as long as the British peerage.

What time is left me, to speak of the progress made since the foundation of this Society in the cultivation of flowers! What great proportions do we see in the trade of the florists! What an increase in the taste of the people! How flowers are taken to decorate every scene of the drama of existence! How bare would the world seem without the refinement of their presence! Our feeling for them is fitly expressed in the language with which Eve, when expelled from the forfeited garden, mourns with deepest tenderness: —

> "O flowers,
> That never will in other climate grow,
> My early visitation, and my last at even,
> Which I bred up with tender hand
> From the first opening bud, and gave ye names!
> Who now shall rear ye to the sun, or rank
> Your tribes, and water from the ambrosial fount?"

Discussion.

At the conclusion of Mr. Russell's remarks Benjamin G. Smith moved a vote of thanks to him for his eloquent address, which was unanimously passed.

Charles M. Hovey was called on, and expressed himself as much pleased with the *résumé* of the progress of gardening in New England, which had been given. He agreed with Mr. Russell that there have not been any great changes in the climate since the first settlement was made in Massachusetts by the Pilgrims. We remember only the extraordinary seasons, and hence our impressions of changes are erroneous. Forestry is now attracting much attention, and the planting of forests is urged as a means of preventing droughts. But drought, as remarked by the lecturer, was an ever-present menace to the Pilgrims before the forest had been cut off, as it is to us today. We must go on in the practice of gardening, not expecting any change for warmer or colder.

F. L. Capen was struck with one point mentioned by Mr. Russell, — that the Indians were in the habit of burning off the forest, and he thought this might account for the droughts experienced by the first settlers. The subject of sewerage and fertilizers is of great interest. Many towns are barren and unproductive; and if farmers cultivated the ground better they would not be obliged to cultivate so much, and they could then

devote more attention to forests. If all the fertilizing material were saved we might cultivate forests that would vie with those of California.

Leander Wetherell had been much interested in the remarks on drought. The clearing of our forests seems to have a decided effect on our springs and streams of water in time of drought, making them dry up more quickly; but the average rainfall does not vary from year to year as much as is generally supposed. Cutting away the forests allows the water to escape more rapidly.

The Indians were mainly hunters, and not corn-growers to any large extent, and they burned off certain areas to give the squaws an opportunity to cultivate the ground, but not enough to destroy the hunting. The speaker had kept a meteorological register, but had not been able to see any change in the climate from cutting off the forest. There seems to be a wide difference among writers as to the connection of drought with the clearing of land, but all are agreed that forests retain water and prevent springs from drying up. Farmers will not apply fertilizers to forests until they have more than enough for other crops. The farmer who plants in well-tilled soil, and takes good care of his crops, will, now as heretofore, be successful.

Robert T. Jackson said that if all the trees are removed from any region the rains will run off in a few days, and evaporation will be more rapid, and if the forests cut away were sufficiently extensive the climate will be changed. Climate is much affected by the ocean currents. The western shores of the Atlantic are much colder than the eastern shores in the same latitude; the climate of Labrador, for instance, is much more severe than that of the British Islands. The temperature of Newport, R.I., is ten degrees higher than that of Boston, and the season is three weeks longer. The Irish yew will flourish there, and the waters contain many marine animals not found north of Cape Cod. All these differences are due to the Gulf Stream, which warms the adjacent countries.

Hon. Marshall P. Wilder said that the influence of climate on all animal and vegetable life is such that a thorough knowledge of it is necessary to success in cultivating plants or breeding animals. He expressed his deep interest in the welfare of the Society, which lies very near his heart, and in promoting the interest of these meetings. Such discussions are the great improvement of the age. This Society has exercised more influence than any other horticult-

ural society on this continent. Mr. Wilder congratulated the President on his inauguration, and hoped that all the days of his administration would be as bright as this day.

Col. Henry W. Wilson said that the matter of the climate lies at the foundation of all things; it must be considered in planning a house or a garden. There has been a good deal of speculation as to the effect of forests upon climate. Many assert with emphasis that the recent irregularities in rainfall are due to the destruction of forests; and yet there is now more forest in Massachusetts than ever before within the memory of man. One town has five thousand acres more than seventy-five years ago. There is a difference in the character of storms. In some years we have drought, notwithstanding a great rainfall, and in others a meagre rainfall and no drought. The extraordinaries remain fixed in our minds. There are places on the earth where the planting of trees has seemed to be followed immediately by increased precipitation of moisture. The rainfall in Massachusetts has increased ten per cent in forty years; in the last ten years it was ten per cent more than in the first ten years of the last forty. In Utah the rainfall has increased ten per cent; in the Central States the increase has been eight per cent in the same time. It is idle to speculate on causes when the facts are not fully known; the result can only be a distortion of facts to support some pet theory; and no man succeeds in any scientific investigation who mounts a hobby. It is warmer in England than here; but the fruits there are not equal in flavor to ours, because the summers are cooler and the winters are warmer. Planting forests increases the retentiveness of the soil; the ground is spongy, and the water passes away slowly. Thus the woodlands may be made to be great natural reservoirs upon the hill-sides for our future water supply. Snow-drifts remain in the forests longer than on the open ground. There are thousands of acres of land in this State which somebody has got to cover with forests. We get, on the average, sufficient precipitation of moisture, but some years there is too much and other years not enough.

William T. Brigham presented, on behalf of his brother, Charles B. Brigham, M.D., of San Francisco, Cal., a photograph of double and single Tuberous-rooted Begonias. Dr. Brigham has a great variety of these plants, having collected every kind that he could procure. Some are like double almonds, and others like small white roses, the colors being as various as the forms. The thanks of the Society were voted to Dr. Brigham for the photographs.

O. B. Hadwen, Chairman of the Committee on Discussion, expressed the gratification of the Committee at the attendance at this first meeting of the season, and announced that on the next Saturday, Col. Henry W. Wilson would read a paper on "Mulching."

BUSINESS MEETING.

SATURDAY, January 10, 1885.

An adjourned meeting of the Society was holden at 11 o'clock, the President, JOHN B. MOORE, in the chair.

David Nevins, of Framingham, was proposed by Hon. Marshall P. Wilder as a Life Member of the Society.

The Annual Report of the Committee on Gardens was read by John G. Barker, Chairman, accepted, and referred to the Committee on Publication.

The Secretary read a letter from M. Ch. Joly, of Paris, a Corresponding Member of the Society, inviting contributions from the members of the Society to an International Exposition of Horticultural Products, at Paris, May 20–31, of which M. Joly is president. The subject was referred to the Executive Committee.

The Secretary also read a letter from the New England Meteorological Society asking the coöperation of horticulturists and others in the work of establishing a system of simple meteorological observations throughout the New England States.

Adjourned to Saturday, January 17.

MEETING FOR DISCUSSION.

SOME CONSIDERATIONS REGARDING THE PRACTICE AND UTILITY OF MULCHING.

By Col. HENRY W. WILSON, Boston.

Some months since, at a general discussion of agricultural matters, a gentleman of experience and reputation as a cultivator

confessed to a lack of practical information upon the subject of mulching, and expressed a wish that some one might give light upon the subject.

Without presuming to be able to add anything to what has previously been uttered, or to furnish any great amount of light, the writer can give the result of a good deal of reading, considerable observation, and some practical experience in the matter from twenty to twenty-five years ago, together with his deliberate conclusions derived from these sources.

Mulching was tried by him as thoroughly and fully as it could be by anybody, with vines, fruit trees, shade trees, strawberries, and raspberries; and the outcome of it was just what it will continue to be with each successive generation as it comes along and gets its experience in the old-fashioned, practical way.

More recently but little has been said about this subject; and, at the risk of repeating much that many are familiar with, the writer has summarized what seemed of interest to him while he was enthusiastic over the matter, that those to whom the subject is comparatively new may avoid useless labor and experiment.

About all of the discussions nowadays that relate to crops of any kind, before they are finished, take into consideration more or less the rainfall or drouth. One has a vivid recollection of some dry season or early frost, and as the rains descend in June and July, causing summer floods and spoiling the hay crop by an insufficiency of sunshine to cure it, he thinks that more rain falls now than when he was a boy. Another remembers with greatest distinctness an exceptional year of rains and freshets, and now there are not many years in New England when he will not think that the early and latter rains, as a rule of the seasons, are deserting us, and soon to be forgotten. Recollections of youth give but a poor means of comparative meteorology, and the most accurate observations and records of specialists in this department are often misleading.

A year of greatest rainfall may be also a year of such scarcity of moisture, at the proper season, as to be a year of drouth, while another year of less than average rainfall may be a year of fruitfulness and abundance.

In the year 1881 15 inches more rain fell in Boston than in the preceding year, and still 1881 was a year of drouth, because there was a deficiency of moisture during the months of April, July, August, and September; while in 1880 there was a deficiency

in every summer month except July, in which there was an excess of 2¾ inches, and this year (1880), with a deficiency of nearly 12 inches below the average for ten years, was a year of good harvests, although the scarcity of rain in April, May, and June, with excessive temperature, gave a light hay crop; while 1881, with a rainfall 3.43 above the average for ten years, was a year of drouth and failure of crops. I give these two years as an illustration of the fact that the record of total rainfall is no measure of the fruitfulness of the year; but we can rest pretty certainly assured of one thing, — that while, for a period of fifty years, records have shown the earth receiving an undiminished average amount of moisture and heat, still the periodical distribution is unequal and unfavorable; so that in New England we may count upon a continuance of the experience of the Pilgrim Fathers, which has come down to us with our other inheritance, — a legacy of periodical and frequently recurring drouth.

The effects of drouth are so baneful and discouraging to the cultivator that men in every age have sought eagerly to counteract it. The means employed generally correspond with the measure of the skill and experience of the times in which they are undertaken.

In the few thoughts and experiences which are here arranged there is no claim to originality or special authority; but the writer has been at some trouble to collect and summarize points which seem to be essential in the recorded observations of those who have given time and study to the subject, and which appear to cover the matter pretty well, — only this and nothing more.

One resource, toward which many have instinctively turned, is to cover the soil about the plant to be protected with some cheap and abundant material which will break the force of the sun's rays and check the evaporation of moisture with the consequent radiation of heat; this has been termed mulching.

It is one of the most natural things in the world for a reflecting man to think that, as he finds in the forest a mossy carpeting which covers the ground and keeps it continually moist, even so a similar covering in our gardens and about trees and vines would repress noxious weeds, resist the drying action of the sun or wind, and generally prove to be a very useful thing. Men argue that in the realm of nature everything seems to work about right; that checks and balances are there pretty evenly distributed, and that it is generally safer and wiser to follow natural processes.

To this end about every material that seemed suitable to cover the soil as a mulch has been used first or last; leaves of both evergreen and deciduous trees, straw, haulm, hay, both from salt and fresh meadows, rushes and sedge grass, spent tan, sand, sawdust, chips, and bristles have all been tried with a great variety of crops and an equally great uniformity as to the results.

The horticultural literature of from thirty to thirty-five years ago was occasionally flecked with the experiences of enthusiastic amateurs, and it may be of interest today to recall some of them in their chronological order.

In 1845 a gentleman of Ithaca, N.Y., planned an arbor over one of his garden walks and, in anticipation, planted eight or ten grape vines of different varieties (York Claret, Isabella, and Catawba) on the sides of the walk. Subsequently, and without any reference to the vines, he covered the walk thickly with refuse or spent tan bark from the tannery. The next year, having changed his mind as to the arbor, he removed the vines to another part of the garden, and was surprised to find that they had sent vigorous roots from one to three feet into the tan, in some instances even to the very surface, and had filled it with a multitude of small fibres, to the extremities of which small particles of bark adhered. The vines appeared to be perfectly healthy and vigorous, and the circumstance so impressed him that he afterwards continued to make a liberal use of old tan bark with success in the treatment of his vines; but, being an amateur, he omitted to mention it lest it should prove to be new only to himself.

In the spring of 1847 a hundred and fifty fruit trees were set out in an orchard having a good, dry soil; one-third of them were mulched with litter six inches deep; the season was hot and dry; of the mulched trees all lived and thrived, while of the others fifteen died.

Mr. H. W. S. Cleveland, in New Jersey, found that mulch of old chips prevented pears from cracking and seemed to impart a superior flavor to the fruit; the bark of the trees also had an increased smoothness.

Native grapes were saved from rot and mildew by mulching. In the fall it was drawn back from the stems of the vines to avoid harboring mice and other vermin.

In 1848 a writer in the "Gardeners' Chronicle" treated the subject of mulching more as a matter of top-dressing, claiming that much food is thus speedily furnished to a suffering tree. He

regarded with satisfaction the great number of surface roots which he observed to be encouraged by top-dressing, and considered them to be an evidence of permanent benefit. He deemed it one great advantage of mulching that, when, under its stimulus, the tree makes a too rampant growth, by the removal of the mulch in whole or in part, the tree may be thereby checked and subdued in its growth.

With currant and raspberry bushes the use of mulching was recommended; also the addition of five or six inches of good soil, which stimulated and nourished a strong growth of surface fibres.

In the autumn of 1848 a gentleman who had previously observed the grievous effect of drouth upon his trees planted some nuts of native forest trees, which in due time germinated, and the young trees received constant care and attention. While gathering the nuts in the fall a quantity was left in a hole in the ground, and subsequently covered with some prunings of trees. In July he observed that green shoots were forcing their way through the brush, and upon examination found that some of them had made a growth of three feet from the nut, while his carefully tended seedlings had grown only four inches. The reason for this seemed so apparent to him that he immediately forked up the soil about all of his trees, both great and small, and watered and mulched them well, but with what material he omitted to state. In two or three days new buds made their appearance; in three weeks, trees whose leaves had previously fallen made shoots nearly a foot in length.

In the spring of 1849 a quantity of fresh spent tan bark was hauled directly from the tannery, and a heavy dressing of it was put upon a vine-border; the remainder, amounting to six or eight cart-loads, was put in a heap at the distance of a few feet from an Isabella grape vine. Upon examination in the autumn it was found that the vine had sent its roots up into the tan heap more than a foot above the surface of the ground, and their fibres had spread in every direction. Never had so fine grapes been raised in the grapery as after this dressing of fresh spent tan was applied.

A writer in May, 1850, stated that he had tried mulching with all sorts of material, — straw, litter, seaweed, and whatever else he could get of a like nature, — not only upon newly transplanted trees, but also upon all kinds of garden vegetables, melons, and flowering shrubs. He seemed to think that the great advantage is with newly transplanted trees, and he had found it easy thus to

cultivate some delicate garden favorites, which had given him a good deal of trouble before he tried it. Although he was not prepared to take the ground with some that mulching is more beneficial than a coat of manure, he expressed the opinion that it is of great value, especially to the fruit and ornamental tree grower.

In 1850 an experienced horticulturist reported that he used spent tan to spade into his stiff clay soil, with good success; also as a mulching for strawberries, pear trees, and shrubs. It was free from mouldiness; and roots struck in it readily, especially runners of the strawberry.

Mulching, with buckwheat straw, pear trees that were set after being long out of the ground and very dry proved successful, when similar trees not so treated did not recover.

An orchard of six hundred apple trees, which had been planted four or five years, and had seemed to be checked in growth, was mulched four inches thick for about four feet around each tree with coarse fresh meadow hay and buckwheat straw; the effect was a good stimulation of vigorous growth, ample bloom, and enormous crops of fruit. Moss, which had begun to gather upon some of the branches, peeled up and dropped off, while the whole appearance of the orchard was entirely changed.

With strawberries the same writer had excellent results, using spent tan bark, applied two inches thick, after New Year's, to a strawberry bed that had been previously covered with asparagus haulm, and was not sufficiently protected from frost. The plants were being lifted by the alternate freezing and thawing, but the tan bark prevented further injury and gave good success.

A writer in 1851 advocated mulching trees with any suitable material as far as their branches extended; also mulching of dahlias with soft spongy meadow or swamp moss. With the same tubers planted side by side, and having the same treatment otherwise, the moss-mulched dahlias far outgrew and outbloomed the others.

The same kind of moss was used to mulch flower seed beds. With these the plan was to prepare the soil nicely and sow the seeds as usual, covering them with the damp moss, and put a flower-pot or seed pan over them, watch them carefully, and when the seeds germinated, to lift the pan little by little, until the plants acquired color and strength, when the moss was removed. This is the plan now generally adopted for the successful germination of

those seeds which require much time with constant and uniform moisture as well as warmth.

Another writer who had previously advocated mulching as a good practice, testified to his continued faith in its advantages, and said that his dwarf pear trees made masses of fibrous roots in a single season, and quite double the amount made by other trees similarly situated but not mulched. He also testified to the excellence of tan bark for strawberries.

Andrew J. Downing was an advocate for the use of tan as a mulch for strawberries, preferable to straw, litter, or leaves. A covering of two inches of tan gave good protection against frost, and the plants came out of the winter in better condition than those mulched with any other material. He had a special word of commendation for the use of spent tan bark as a mulch for newly transplanted Norway spruces.

In the South it was noted that thorough mulching was a great benefit to fruit trees which had been recently transplanted from Northern nurseries, and obviated one great difficulty in the acclimating of such trees in the South.

In December, 1847, after the ground had frozen solid, a gentleman mulched about three-fourths of his strawberry bed with some old spent tan bark that had been upon his place for eighteen months. The tan was spread evenly over the entire surface to the depth of three inches, and for three years the difference between that part of the bed and the other was very marked in favor of the application of the tan bark.

In the fall of 1850, having about one-fourth of an acre of fine strawberry plants that were put out in the previous spring, seeking to profit by his successful experience, he proceeded, just before the ground was frozen, to cover them with fresh tan bark right from the tannery. The result was quite unexpected and equally unsatisfactory, for in the spring nearly all the plants were either dead or utterly ruined, and he was greatly puzzled to know what did the damage. His only consolation was to know that a neighbor of his also lost all of his plants in the same way, and from the same cause. Another neighbor, who had for ten years used tan as a mulch for strawberries, was ready with his explanation; he attributed the loss to an excess of the tan bark covering over and around the crown of the plant. He was accustomed to use not more than a quarter of an inch in thickness immediately around the plants, but covered the rest of the surface from one to two

inches deep. He had never lost any of his plants as a result of this practice, but thought that they were greatly benefited. The only covering which he permitted to be placed over the plants in the winter was a slight litter of straw, and this was removed early in the spring, or as soon as the warmth began to stimulate the plants to growth.

Another cultivator says that one inch of tan bark is enough for a mulch; three inches will produce fermentation, and greatly injure if not kill the plants. He thinks, however, that, according to his experience, the best mulch is a highly tempered steel rake, with eight-inch prongs, applied at least once a week during the season. This conclusion is worthy of note as being the first published intimation which I have met, that *tilth* is the best method of promoting a moist condition of the soil, and enabling vegetation to endure a drouth, and this was thirty years ago.

I have here recounted the experience of horticulturists of a generation gone by, because it is identical with what is heard constantly nowadays, as men go on repeating the experience of their fathers, without stopping to inquire to what their success or failure was owing. Perhaps I may say right here, that within the last twenty years I have tried pretty much the same line of experiments, as far as they are stated, and have come to identical results.

I am not insensible to the claims that are urged, that tan bark contains more or less tannin, and that tannic acid is an element in the strawberry plant, and, therefore, a coating of spent tan is beneficial to the plant. In either wish to start anew, or to be drawn into a controversy upon this subject, on which volumes have been already written. We are considering mulching solely as a means of promoting the moisture of the soil.

I am also aware that in the culture of the gooseberry the soil in June and July seems to be too hot for the plant, and a covering of leaves seems to impart coolness to the soil, and thus obviate this difficulty; but every one who has tried this expedient has before long found all of his roots on the top of the ground, which is just where they ought not to be.

I know of a vineyard where the cultivator covered about one-half of the surface with rushes, chips, and weeds that were washed ashore on the beaches of an adjacent river. An unexpected advantage was noted, which was, that although rose-bugs were as abundant as the year previously, when a half-dozen lads gathered

a round half-bushel of the pests by hand-picking, the year that the mulch was tried but few bugs were found in that part of the vineyard, while in the other they were as thick as ever. The cunning insects seemed to appreciate the fact that this covering of the earth made a very unfavorable place of hibernation for their young, and discreetly avoided it. But here, as elsewhere, the tendency of the mulching was observed to be to encourage a rank growth of surface roots.

By the use of dry leaves, sawdust, and spent tan, cultivators have been able to maintain a moist condition of the surface of the soil, but all have noted that an abundant growth of fibrous roots was stimulated near to the surface. The immediate result of the application seemed to be all that could be desired, and to include all of the elements of success; but subsequent and repeated observations, accompanied by thoughtful reflection upon the functions of soil and vegetation, together with persistent efforts to reach the desired result by other means, have caused me seriously to doubt the value of mulching as a system to counteract the effects of drouth, except with newly transplanted trees, or to facilitate the germination of the nuts of most forest trees, and certain other seeds.

General experience has shown pretty clearly that substances which quickly decay are not to be preferred for this purpose; thus straw has proved to be more satisfactory than hay or rowen; pine-needles than the leaves of deciduous trees, and spent tan than sawdust.

There is no gainsaying the repeated experience that any or all of these materials will check evaporation, and thus contribute to the retention of moisture, but are we entirely certain of the assumed fact, that this end cannot be better attained in some other way, or that moisture is the sole or chief requisite for successful cultivation?

It is certain that, as a general condition of success, warmth is not less necessary than moisture. Any covering of the earth, although it may, by its non-conducting qualities purely, prevent evaporation, will nevertheless as surely prevent the absorption of heat by the soil, although, of course, obstructing radiation of heat previously acquired.

The warmth which stimulates vegetation in these latitudes comes from without, and by absorption. It is also inevitable that a covering which screens the surface of the earth from the action of the

sun and air deprives it of the agencies most active and useful in elaborating food for plants, and thus promoting fertility.

Few people realize what a wonderful laboratory exists in the soil; how curious, how delicate and intricate are its processes, — so mysterious that the skill of the chemist is yet as unable to rival or reproduce that which is known as it is to detect or explain the unknown.

So far as facts have been ascertained they serve to show that, even though the chemical elements of fertility are supplied in sufficient quantity, still the stimulating actions of heat, light, and air are the leading essentials of plant growth. Moisture is a contributory element after the fact, and can be either supplied or reserved in various ways. To supply it is the work of irrigation; to reserve it is the work of cultivation.

It is easy to see, with but little experience, how a mulch of any suitable substance that simply retains moisture will counteract or diminish the beneficial effects of heat, light, and air; but, for attaining the highest excellence in cultivation, we must procure the lesser benefit without surrendering the absolute requisites; and there cannot be much doubt that a mulch, while it checks evaporation, also retards the chemical activity of the soil.

If the mulching material is of a kind which soon decays it may be dug into the soil when its use as a mulch is ended. But my observation is to the effect that, if this final disposal is good for anything, it were better to have dug it in at the beginning rather than at the end.

Mulching may serve to keep the surface moist; but it will be found that the portion in contact with the ground is apt to mildew, and encourage fungous growth, which neither indicates nor promotes healthful vegetation. We are cautioned, therefore, against the use of easily decaying or fermenting substances. A careful examination of the under surface of most of these mulchings will also develop the fact that it is a snug harbor for slugs, snails, worms, and all minor sorts of vermin, — at least that has been my experience.

On the other hand, if the material is one which cannot be beneficially or properly dug into the soil, after its use as a mulch has ceased, such as tan, sand, or sawdust upon light soils, then the labor of spreading and afterwards gathering and removing it is by no means inconsiderable.

A coating two inches thick on an acre amounts to about three

hundred single loads of stuff, which must cost, at least, fifty or sixty dollars to spread and remove. How many times could you go over an acre, with a cultivator, for fifty dollars? Certainly more than thirty.

It has been always observed and mentioned by experimenters that the use of mulching induced a profuse growth of fibrous roots to push up to the surface in their search for moisture and nourishment, more particularly and decidedly when the mulch contained nitrogenous matter, or other elements which stimulated the growth of the plant.

It is also not a little remarkable that none of those who have recorded this fact so repeatedly have noted that this is not a useful result. As a permanent condition of a plant to enable it to resist all the vicissitudes of our climate, its feeding roots should be below the surface; and although the ill effects of their being too near the surface may not be so apparent in those crops which are annual as they are with the strawberry, yet with all plants of a permanent character, such as vines or fruit trees, the pushing of these fibres to the surface should be discouraged.

Vegetation should be encouraged by all means to go downwards for its moisture, wherever it may ramble for its nutriment.

The roots of the strawberry and clover have been traced five feet below the surface, and the grape root has been found at the depth of eleven feet. They will always descend in search of moisture to the depth at which the ground waters stand in the soil during the season of greatest activity and growth. Wherever the air can penetrate the earth depend upon it that a root will find it out and follow.

How can the temporary advantages of mulching be otherwise attained permanently? A little thoughtful examination will indicate the answer. Careful investigation of the condition and mechanical effect of heat and soil upon moisture develops the fact that, except when the rains are replenishing the earth, moisture is continually ascending in the soil by the process of capillary attraction, to be absorbed at the surface by the air with which it comes in contact.[1] In a well-cultivated field, not more than from one-tenth to one-eighth of the rain that fell upon the soil finally passed off by per-

[1] In England, during ten years' observations, only 43.4 per cent of the rainfall percolated into the soil and passed away through the drains; while 56.6 per cent was accounted for as evaporated from the surface of the uncultivated soil. With cropped land the evaporation was yet more considerable, varying with the crop.

colation; the remainder was drawn to the surface and evaporated by the process described; or contributed to the support of vegetation. The natural tendency of earthy matter thus to raise water is not generally appreciated, but can be readily seen when so dry and porous a material as coal-ashes is deposited upon a slightly damp surface. Although the heap be quite large, yet, in a short time, I have observed the dampness to have penetrated through the entire mass from below. Anything that breaks up the uniform continuity of the texture of the soil, by which atom after atom of water is brought to the surface, will accomplish the first step in retaining the moisture of the soil, under conditions favorable to vegetation.

Now mulching does not do this at all. It only checks or moderates the approach of the atmosphere to the moistened surface of the soil, and therefore retards evaporation to that extent; but the reason why there is always so much moisture beneath the mulch is because the capillary action of the soil elevates the water to the surface faster than it can evaporate.

Any material of loose texture that is a good non-conductor of heat will, when applied to the surface of the ground, retard the movement of the air and prevent evaporation.

Spent tan bark meets this requirement better than any other material that can be applied to the land. It is light and porous, and therefore retains a cushion of confined air, which is one of the best non-conductors in nature. The gentle showers, which simply moisten the earth, pass through it readily, as do the heavier rains, which are absorbed and longer retained.

Now dry soil is likewise an excellent non-conductor, made doubly such by being loosened and pulverized, and thus intermingled with air. This is precisely the condition of the soil after a thorough cultivation; when thus rendered fine and light the surface becomes truly a cushion of air and dry earth, the continuity of the insensible process of convection of the water of the soil is broken, the point at which the upward passage of the water of the soil ceases is removed to the depth of the cultivation, the free access of the air to the continuously moist surface is hindered, and you have accomplished all of the beneficial effects of mulching in a cheaper, more intelligent, and scientific manner.

Years of observation and considerable experience have indicated clearly that the best mulching is the hoe, or the rake and cultivator.

Many an observant farmer has borne his testimony to the suc-

cess with which he has carried his cornfields through a drouth, when those of his neighbors have withered, by simply keeping the surface of the soil mellow with repeated cultivation. The surface was thus kept in a condition perfectly fitted to absorb the falling rain, whether it came in a shower or a storm, and after each fall of rain, as soon as the surface became dried, it was again pulverized by the rake or cultivator, and thus brought into precisely the favorable condition before described.

Surface irrigation has not succeeded with the grape for the same reason that mulching cannot permanently, because the tender roots are drawn too much toward the surface, and are thereby in peril of injury from atmospheric changes.

Cultivation, on the other hand, suppresses weeds, obviates the tendency of the fibrous roots to come too near to the surface, keeps the plane of the moist earth covered always with a non-conducting mixture of dry soil and air, and thus facilitates the free admission of the atmosphere to carry on those combinations with and among the elements of the soil which are so essential to perfect success.

The best kept and most fruitful vineyards which I have ever seen were those in which the best tilth was manifest.

This was notably apparent at the visit of the Committee on Gardens to the vineyard of our honored President last September. The whole surface of the ground was as light and smooth as the liberal allowance of gravel stones would permit; not a weed was to be seen anywhere, but every indication of the master's belief that cultivation means stirring the surface of the soil thoroughly and often.

High tilth is by many regarded as a sort of a substitute for irrigation, and has proved successful where ordinary care and cultivation have failed.

Let me not be understood to say that there are not times when a mulching around newly planted trees, or with some small fruits, may be found of temporary benefit and therefore satisfactory; but it does seem to me, from an observation of the experience of many men in many places, during many years, as well as from thorough personal experiment under a great variety of conditions of heat and rainfall, that mulching is but an indifferent substitute for tilling the soil, and that an industrious man, with the rake or cultivator, will obtain vastly more satisfactory results by their diligent use than the disciple of mulching will with his mulch.

Discussion.

Hon. Marshall P. Wilder was called on, and said that Col. Wilson had fully covered the subject. Thoroughly stirring the surface of the soil enables us to avoid the danger of injuries by injudicious mulching. Tan has the tendency mentioned by the essayist, to draw the roots too near the surface, and other materials are more or less objectionable for the same reason. The young rootlets are liable to injury by frost if too near the surface. Another objection to mulching is the production of weeds by the use of improper material, such as hay. The speaker uses rowen or aftermath for mulching his strawberries, covering the ground not more than an inch deep, so as to permit the access of the sun and air. The short clippings of lawn grass form one of the best materials for mulching. There is an advantage in mulching, whether by fine soil or otherwise, but the former is the cheapest and best way of effecting the objects aimed at. It should be remembered that all the food of plants must be in a soluble state, and hence the necessity of retaining in the soil the moisture which percolates into it.

George A. Tapley said that when he began planting young pear trees, years ago, he mulched nearly all over the ground; but one dry day his mulching took fire, and, though he saved his buildings, he lost some of his trees. After that, he discontinued mulching and took up thorough cultivation and fine tilth instead, and had had no difficulty since.

William D. Philbrick stated that the currant and gooseberry, as well as the raspberry and blackberry, are much benefited by mulching: they like a cool, moist soil; while the grape, which needs all the heat of our summers, and more, does better without mulching. As a general thing the action of the cultivator is better than mulching.

Leander Wetherell mentioned some instances where mulching had been extremely beneficial. In one garden which he knew, where the soil was gravelly, trees were preserved by mulching. Capt. Pierce, of Arlington, who was called the "King of Orchardists," used to mulch under his Williams apple trees just before the fruit began to fall, and afterwards raked up the material for other purposes. The editor of the "Rural New Yorker" mulches his potatoes about two inches in depth with swamp hay run through a cutter. The best mulch is the free use

of an iron rake, with long, sharp teeth; if this plan is pursued the roots will feed where they ought to feed. Deep culture has a favorable effect in preserving a crop from injury by drought.

Benjamin G. Smith said that all good cultivators agree as to the benefit of stirring the soil, but in some cases mulching may be of service. He used sand as a mulch under his apple trees, and they appeared to be benefited by it. It is clean, and does not harbor insects or seeds of weeds, does not bake after rain, and is not in danger of fire. It is especially valuable on strong clay or heavy loams. Mr. Smith quoted, from the "Report of the Michigan Pomological Society" for 1876, pp. 104, 105, 162, 163, passages concerning the best and worst materials for mulching.

William H. Hills said that he was in the nursery business years ago, when mulching was generally recommended, and he is still of the opinion that sometimes it is very valuable. In setting young pear trees, with few fibrous roots, he mulched with good effect, and sheltered the stems of the trees from the sun with paper. Since then there has been a change in theory and practice with regard to mulching. Some recommend heavy mulching and others light. The most serious objection to it is the drawing of the roots to the surface, so that when the mulch is removed they are liable to injury in an unfavorable season. The only question is whether we can get along without it; in most winters we can, for a good covering of snow is the best mulch. Hay from the salt marshes, which he gets boated up the Merrimac river, never brings in foul seeds, but swale hay does, unless cut very early, and the produce of the seeds will grow even on high, dry land. Small fruits ripen in the season when most liable to suffer from drouth, and consequently are much benefited by mulching. It also protects strawberries from being soiled.

Mr. Smith said there are cases where mulching is an absolute necessity. He covers the ground between his rhododendrons and azaleas with forest leaves, which are never removed, but added to year after year.

Mr. Hills asked, What is the objection to applying mulch to a strawberry bed in autumn and removing it in spring?

Mr. Wilder said that a winter covering is not properly a mulch. He covers his strawberries with aftermath in autumn, takes it away in the spring, and replaces it when it is necessary to keep the fruit clean.

President Moore said that a covering in the fall is not a mulch

but protection. He always removes such a covering in the spring.

Col. Wilson said that in his paper he studiously avoided all reference to winter protection, for that is an entirely different thing from mulching. In California the farms and vineyards are not cultivated as with us; cultivation is something that they do not fully understand there, but where it is practised they obtain the best results. He got his best ideas on cultivation as a substitute for mulching there. Anything that mildews is bad for mulching. The best material is that which, while keeping the ground moist, affords the freest and most perfect circulation of air.

Mr. Wilder said that he felt great pleasure that these meetings are continued, bringing horticulturists together to compare their experiences. The lecture today is a most satisfactory explanation of the philosophy of mulching.

O. B. Hadwen said that all present were delighted with the essay, which is on a most important subject. It might be advisable to mulch dry, gravelly soils when it would not do for strong, retentive soils.

Mr. Hadwen, as Chairman of the Committee on Discussions, announced that on the next Saturday Avery P. Slade would read a paper on "Forestry."

BUSINESS MEETING.

SATURDAY, January 17, 1885.

An adjourned meeting of the Society was holden at 11 o'clock, the President, JOHN B. MOORE, in the chair.

No business being brought before the meeting, it adjourned to Saturday, January 24.

MEETING FOR DISCUSSION.

FOREST TREE PLANTING.

By AVERY P. SLADE, Somerset.

The subject of Forest Tree Planting on worn-out lands, though to a limited extent familiar in practice, does not receive that attention which its importance demands. The interest recently

awakened in the public mind in regard to the depletion of our forests may be regarded as a sufficient apology for inviting your attention to the topic announced.

Some one has estimated that no less than 100.000 acres of wood and timber lands must be cleared daily to supply the demand for fuel and for the various industries of the country, to say nothing of the vast amount that is annually destroyed by forest fires and decay. This demand would necessitate the yearly cutting of 31.200.000 acres, an area somewhat larger than the State of New York. From this fact we are in a measure enabled to comprehend with what rapidity our forests are disappearing.

If the removal of the forests changes the meteorological conditions of a country, or if the amount of rainfall in a given territory is in some degree proportional to the area covered by forest, the subject assumes an importance which cannot well be overrated. I think it is stated that Prussia, relying on the correctness of this hypothesis, requires, by legislative enactment, that for every tree felled two shall be planted. While the Legislature is powerless to stay the axe of the woodman, it might yet do much to encourage the planting of forest trees, and might thus in some degree avert the evil consequences which must surely attend the final or even partial destruction of the native forest.

Pasturing exhausted soils, or cropping them with rye, yields but a poor return; and nothing has a more demoralizing effect on an agricultural community than the cultivation of large areas with very small profits. There are thousands of acres in Massachusetts which really yield no profit to the cultivator, but which, if planted with White Pines, at a trifling expense, would pay a reasonable rate of interest on the investment; and this planting would speedily convert large areas of unproductive land in Eastern Massachusetts into delightful groves, adding a positive beauty to the landscape and forming a source of wealth to the community.

I have spoken of the White Pine (*Pinus strobus*) because I regard it as best adapted to our climate, and to the soil of most of our waste lands. A soil in which the White Oak flourishes will produce grass; and a soil that suits the Chestnut will grow grain; but the White Pine not only grows rapidly on land apparently destitute of all plant food, but actually enriches the soil on which it grows.

I am aware that this tree cannot be successfully grown on lands near the seaboard, and would urge for such localities the planting

of some species known to be suited to the soil and climatic conditions there encountered. The Pitch Pine (*Pinus rigida*) seems to struggle for existence on the sea-coast, and is of slow growth, and produces a wood of little value except for fuel; and he who shall introduce in its place a hardy tree of rapid growth under a like exposure, should be regarded as a public benefactor.

The trees of softer wood, whose fibre is susceptible of being reduced to pulp, and rolled into paper, may prove as valuable to the next generation as the oak has been to the present. Iron has already supplanted oak in marine architecture, and paper may yet take the place of both.

To encourage and promote any new enterprise we have first to show that it is safe and profitable as a business undertaking. We therefore propose to examine this subject of Forest Tree Planting in the light of an investment.

In the case of every experiment that has come within my knowledge the result has proved eminently satisfactory. Although in many instances pines have been planted because the land would produce nothing else, and often for the purpose of gratifying the taste by covering a rocky hill-side or sandy plain, and not with a view to profit, and though they have rarely, if ever, received any culture after planting, in no instance that I have investigated has the outlay failed to prove a paying investment.

Mr. Zebulon Pratt, of Bridgewater, purchased 25 acres of worn-out land in North Middleboro, near the village of Titicut, for which he paid $9 per acre. Having a desire, as he says, to improve the view, and to learn the result from a moderate outlay, but not anticipating a profit, he had it set to white pines, in the spring of 1863, at an expense of $6 per acre, and two years after paid a man $47 to fill up the vacancies where some had died, making the whole cost of setting $200.

The plants were from 6 inches to 18 inches in height, and were set in straight rows 10 feet apart each way. Mr. Pratt wrote me, in December, 1883, in answer to inquiries, "that the trees are now probably from 12 to 16 inches in diameter, and in a thrifty condition," and that he has from time to time been awarded premiums by the Plymouth County Agricultural Society for the best plantation of pines. The lot is taxed for $800, which is based on a two-thirds valuation; and as towns are inclined to favor experiments of this kind, it is fair to presume that the assessors' valuation is not too

high. and that the cash value of the lot is not far from $1,200. Comparing this with the outlay, we have:

Cost of land	$225 00
Setting trees	195 00
Taxes for 20 years	120 00
Aggregating	$540 00

which sum, in 20 years, at 5 per cent compound interest, amounts to $1,431, or $231 more than the estimated value of the plantation. But Mr. Pratt says that he did not embark in this enterprise for a profit, but to benefit the inhabitants of the village, and that he might be remembered pleasantly by those coming after him.

Had he planted this grove with a view to profit solely, he would undoubtedly have set the trees at intervals of 10 feet by 6, instead of 10 feet by 10, thus having 726 to the acre, instead of 425; as it is pretty generally conceded that pines standing at 6 feet by 10 will make a growth of more value than when planted at a greater distance. When planted 10 feet by 10 there is more growth of branches, which are of little value, and less growth of body, than when planted nearer. Now if 425 trees to the acre brings the value of the lot up to $1,200, then 726 trees to the acre would be worth upwards of $2,000, which sum is $272 more than the whole investment would have amounted to at 6 per cent compound interest for 20 years.

After receiving Mr. Pratt's letter I visited the lot, and examined it as well as I could, and was well paid for doing so. The plantation covers a sterile ridge, consisting of sand and gravelly loam, sloping east and west, and evidently well suited to the growth of white pines. So far as my examination extended I could discover no vacancies in the rows caused by trees dying out. But what surprised me most was the number and extent of the lateral branches. Beginning near the ground, each tree seemed to vie with its neighbor in throwing out horizontal branches in every direction. These limbs were from 5 feet to 15 feet in length, and interlocked with each other in all imaginable ways, forming, in many places, an absolutely impenetrable jungle. The conviction was irresistible that, had these trees been properly trimmed from time to time (and the wood so obtained would have paid the ex-

pense), their present value would have been enhanced at least 33 per cent.

Here were said to be 10,775 trees, and, could the whole growth have been thrown into the trunk, they would, I think, have been worth, at a moderate estimate, at least 25 cents each; or a sum total of $2,694, exclusive of the ground they stand on.

Mr. J. D. G. Williams, of Raynham, in answer to some inquiries, says that he set a piece of pine in 1850; the value of the land was $10 per acre, and the cost of setting $5 per acre; and after 25 years' growth the standing wood was sold to a Mr. Thayer, of Taunton, for $150 per acre, leaving the land, as he says, in good order to set again. A very large profit on this investment is apparent without demonstration.

Mr. Williams also set a piece of pine in 1841 on land of the same value, the cost of setting being $6 per acre. This is perhaps one of the earliest experiments of the kind made in Bristol county. These trees, apparently, came to maturity in 1876, as no perceptible growth has been observed since that time. They were set in rows not equidistant but varying from 6 to 9 feet, and from 4 to 6 feet from each other in the rows. A portion of this wood is still standing, and attracts more or less attention. The lot has an eastern exposure, and the trees in the first row on the east side were evidently set for a wind-break, being not more than 4 feet from each other. They are large, with many strong, angular branches, resembling in shape an oak as much as a pine, and containing as much timber, tree for tree, as those less exposed, though not of so good a quality. This lot was examined in 1876 by an experienced lumberman, with the view of buying it, and his estimate of the wood at that time was 75 cords to the acre. About two-thirds of this wood or timber is suitable for box boards, and is worth at the mill, three miles distant, $6 per cord. No arithmetical process is required to show that the outlay here has been a profitable investment.

The late Mr. Richard Sampson, of Middleborough, set a piece of pine on land too poor to cultivate. The growth is now 31 years old, and the wood has been estimated to be worth $150 per acre. But if the worth of an article is what it will bring in market, a much higher figure would better represent its value. This piece, which contains about 10 acres, is remarkably thrifty, and its growth during the next decade will greatly increase its value.

The groves of which we have spoken may well be styled self-made groves, for, excepting the occasional removal of a dead tree, they have received no treatment calculated to hasten their growth or improve the quality of the timber. One noticeable feature in all the groves I have examined is an absence of uniformity in the size of the trees; though all are nearly equal in height, they are of diameters varying from 10 to 20 inches. Occasionally we find a tree of the smaller size, which has struggled for equality from 10 to 20 years, when it was overpowered and its life crushed out by its big and thrifty neighbor; while the larger trees appear to live out all their days, and rarely die, except of old age.

The foregoing instances of rapid growth and satisfactory results are not exceptional cases; they were selected for notice because I was able to get items relating to their history with greater facility, and more in detail, than I could in the case of other groves. Plantations of pines from 5 to 30 years of age may be found in Norton, Mansfield, Taunton, Raynham, Easton, Randolph, Middleborough, and the Bridgewaters; all giving promise of remunerative results.

In investigating this subject I have been somewhat perplexed at the wide range of opinion found to exist in regard to the details of pine culture. One gentleman says they should not stand nearer than 10 feet to each other, and should occasionally be trimmed; while his neighbor asserts that they should be planted very thickly, letting nature do the trimming and the fittest survive. Others say that artificial trimming is often followed by death, and always by oozing of the gum or sap, causing dark spots in the lumber, which the tree will never outgrow; whereas, if the limbs are allowed to fall from natural causes, the wounds that may result quickly heal, and the lumber will be of a better quality. One lumberman asserts that if the tree is trimmed when the sap is dormant no bad or injurious effect will follow; while his partner advised me, in a sort of confidential manner, that if the trimming is done when the sap is in motion, the wounds will quickly heal without injury to the tree. Who shall decide, when doctors disagree? A difference of opinion also exists in regard to the age at which the pine should be cut, to yield the greatest profit. A gentleman of my acquaintance, in whom I place great reliance, having a grove 31 years old, found, by careful experiment, that the growth of the last 10 years equalled that of the first 20.

A point on which all agree is that the young seedling pines

should be carefully sorted before setting, and those uniform in size and vigor should be set together. The propriety of this is obvious, as no one would propose to feed a calf and a two-years old steer in the same manger. I have no practical experience in the cultivation of pines, but, had I a piece of land which I desired to set for a profitable investment, I would plough the land in the fall, and set in the following spring. I would carefully assort the plants, and set those of the same size by themselves, at intervals of 10 feet by 8, thus using 543 seedlings to the acre. I would run a cultivator between the rows about twice a year until the plants had become well rooted, and attained the height of 3 or 4 feet. I would also, with a sharp knife, cut off one or two of the lower lateral branches or shoots, always cutting upward, so that the bark on the under side would not be stripped or torn from the trunk. This I would do annually so long as any branches remained within my reach. By ploughing I should secure to the soil whatever organic matter in the shape of moss or grass there might be on the surface, and by using the cultivator I should destroy or greatly discourage any plant that might undertake to subsist on the scanty food of my pet seedlings, and at the same time increase the absorbent power of the soil, and thus furnish a greater amount of moisture, so essential to the thrift of a young tree in the early stages of its growth. By early and judicious pruning I would throw the growth into the trunk, and gradually accustom its smooth and tender bark to resist the effects of the sun's rays, from which nature evidently designs it shall be shielded by a profusion of lateral branches. This mode of culture would reduce to a minimum the risk of loss by fire. By carefully assorting my trees I would found my colony on a basis of equality, giving seedlings of the same size and vigor equal chances in the race of life, and thus to a great extent avoiding that inequality in size which so much lessens the beauty of the grove.

The treatment above outlined might perhaps be profitably varied by sowing broadcast between the rows the seed of the White Birch (*Betula alba* var. *populifolia*). This should be done when the pines are 4 or 5 years old. Being the only deciduous tree which is known to flourish best where the land is the poorest, they would soon overtake the pines, and by their dense and rapid growth would so check the lateral branches of the pines that pruning would be unnecessary. At the end of 12 or 14 years the birches should be cut, when they would probably yield as many cords per

acre as they were years old. A natural growth of birches would follow their removal, and would mature with the pines.

Eminent medical authority assures us that where pines are grown to any considerable extent the atmosphere becomes saturated with a sort of resinous vapor, peculiarly adapted to soothe and alleviate the sufferings attendant on pulmonary complaints. As nearly all lung diseases are supposed to be the legitimate product of the climatic influences of New England, not only our interests but our duty to humanity should stimulate our efforts to further this industry.

Thus far I have spoken chiefly of the White Pine because it is well adapted to all worn-out, sandy soils away from the sea-shore, is easily propagated, grows rapidly, and at 30 years of age represents more value than any other forest tree in New England. Experiments are not wanting where other forest trees of various kinds have been grown from seed, giving satisfactory results.

One instance is that of Mr. Zachariah Allen, of Providence, R.I., where an old pasture, containing 40 acres, and valued at $15 per acre, was seeded to a variety of forest trees. An accurate account current was kept, showing that the lot, for a period of 57 years, paid 6 $\frac{92}{100}$ per cent per annum on the original investments.

Mr. Joseph S. Fay, of Wood's Holl, Mass., late a member of the Board of Agriculture, has very kindly given me some of his experience in forest tree planting, briefly stated, which I here introduce. He says: "The greater part of a place I bought at Wood's Holl some years ago was made up of hilly pasture land, — worn-out, sandy, gravelly soil, with many bowlders. It was exposed to high winds from Buzzard's Bay, and was of very little value for cultivation. I began by trying some seed of the native Pitch Pine, sowing it broadcast on the surface in the spring. I afterward bought seeds of the Scotch Pine, and some other varieties, and sowed it from time to time, until I had covered about 100 acres. I used some White Pine seed; but this kind is not suitable to the sea-shore, and unless sheltered from the salt water does not thrive. The native Pitch Pines did well for a time, but they seem of late to be taken with a blight, that has destroyed many of them. The Scotch Pines have done very well, and will make good fuel, though I am doubtful as to their value for timber. I suppose my planting for the last 15 years will average 15 feet in height, which is 1 foot a year, and a thick

forest now covers my hundred acres. Being sown broadcast, they have come up too thickly, and I have trimmed out hundreds of loads for fuel, yet those taken out are hardly missed. My neighbors on the Cape plant with a hoe, — that is, cut a place in the sod and drop the seed; others run light furrows, 6 or 7 feet apart, and drop the seed in the furrows at like intervals, and cover lightly, or even not at all, as you may judge by mine being scattered on the short grass or moss. The object in planting by their method is the saving of seed, and, moreover, knowing where the seed was dropped, they can see whether it has failed to come up. Some of the seed may not start or be visible for a year or two. Where you are, I suppose White Pine is a natural growth, and would do well. Seeds of the different pines can be procured at most of the Boston seed-stores. I would recommend the American Red Pine (*Pinus resinosa*); but the seed is very scarce, and not readily found. It is the Norway Pine of New Hampshire, and a very fine and valuable species, the wood somewhat like the Southern Yellow Pine. You will see from what I have written that my work has mainly been in pines grown from seed sown broadcast, involving the least possible labor and expense. I have planted Chestnuts, which have made a very satisfactory growth, and would advise planting them, and Black Walnuts, if you have good soil and rocky land.

"I have planted many thousands of other varieties, covering a large surface, among which are the Scotch or European Larch, Scotch Birch, English Sycamore, Norway Spruce, Willow, and White Ash, all of which have done well. In sowing pine seed broadcast improve the time after a light snow in March or April, so that you can see where the seed falls, that the planting may be uniform and not too thick. If the land is not too poor, Black Walnuts, Butternuts, and especially Chestnuts, planted from the seed, would I am sure prove profitable investments. The seedling Ash, if planted 3 feet by 3 even, would in a few years yield salable hoop-poles, amply paying cost and interest."

The foregoing statement plainly shows what has been done in a quiet way, involving but little labor and expense, by one having the will and energy to do it.

Mr. Frederick Matthews, of Yarmouthport, Mass., states that he has during the last 40 years planted for himself and neighbors about 300 acres of Pitch Pine. This tree is of slow growth; yet some of the older plantations seeded by Mr. Matthews

reached, years ago, a stage in their growth when it was deemed profitable to cut them for fuel; and he is now cutting good-sized wood for his own consumption in a grove only 30 years planted. He has within a few years noticed a blight, which has proved fatal in many cases.[1]

He gathers the cones in October, and, after thorough drying for two months, shells and cleans the seed, and plants in the spring, with a machine of his own construction. He thinks it pays a moderate interest on the investment, and is acquainted with no other tree that is equally adapted to the soil and climate of Cape Cod, or that could take the place of the Pitch Pine.

This tree, as we have remarked, is of slow growth, even under favorable circumstances, and its rate of growth is retarded as you approach the sea-shore, until, face to face with the ocean, it is so slow that even a careful observer can scarcely see any change from year to year. This is a discouraging fact; but he who would dot the sea-coast with groves as yet knows of no species that will root itself in the moving sand, and flourish in defiance of ocean gales, which spend their fury on the coast. Observation and somewhat extended inquiries strongly favor the belief that there is no tree so well adapted to take the place of the Pitch Pine, and to cover the loose, sandy areas of our coast, as the once noted Ailanthus (*Ailanthus glandulosa*). Being aware of the prejudice existing against this tree, inherited chiefly from a former generation, let us examine its merits, and render a verdict in accordance with the facts.

The Ailanthus is a deciduous tree, and, we are told, is abundant in the northern provinces of China, and indigenous to that country. In 1750 it was introduced into Europe as an ornamental tree, and was brought to this country about 1820. From its rapid growth and tropical appearance it soon became a favorite, and was planted extensively in the cities of New York, Philadelphia, Providence, and Newport; and the demand for the young trees far exceeded the supply. As soon as the trees were old enough to produce flowers it was discovered that they emitted a very offensive odor, and the pollen which fell on the roofs of neighboring houses rendered the water collected from those roofs unfit for drinking or culinary purposes. On discovering these objectionable characteristics, those who had been cherishing this rare exotic

[1] This blight and that noticed by Mr. Fay are doubtless caused by the Pine Moth of Nantucket (*Retinia frustrana*).

were suddenly seized with disgust, and war was declared against the offending Ailanthus, resulting in its almost complete extermination. A few trees may still be found, scattered over the Island of Rhode Island, and in some of the villages of New England, — lineal descendants of a despised and persecuted generation.

The objection to the Ailanthus which operated so swiftly to its discredit disappears quite as quickly when it is regarded in the light of a forest tree. The wood possesses many valuable qualities. Its specific gravity is said to be but little less than that of the Oak, and more than that of the Black Walnut. It is of a pale cream color, admits of high polish, seasons readily without checking, and is a strong, durable wood when kept from the weather. Professor Sargent, to whom I am indebted for much valuable information relating to the Ailanthus, says, in his "Notes on Trees and Tree Planting,"[1] "There are thousands of acres of shifting sand and barren soil along our sea-coast, southward, too poor and too exposed to produce, naturally, anything but a scanty crop of beach grass, on which the Ailanthus would thrive, and which, thus covered, would add enormously to the natural products of the country. Such plantations would amply and speedily repay the original cost, both in direct income and by the protection it would afford to more valuable land. Valuable timber, for purposes of construction, might not grow on soil so poor and exposed, but immense quantities of fuel, easily accessible to market, would be produced from land now worse than useless to its owners. On almost every inland farm there is some old, neglected gravel-pit, or bank, or knoll, too stony and poor for cultivation, which might be profitably planted with the Ailanthus; and these plantations would provide in a dozen years, more or less, a large amount of valuable fuel, and might be cut, and cut over again indefinitely, as there seems to be no limit to the power of this tree to throw up suckers from the roots. Or, if permitted to grow from 20 to 40 years, such plantations, costing but little to make, and occupying land good for no purpose but to pay taxes on, would produce a material valuable for industrial purposes, for which a ready sale at good prices could always be obtained."

Mr. George P. Marsh, in remarking upon the efforts of the Russian government to cover with forest growth the northern coast of the Black Sea, where the loose, sandy soil, to the depth

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[1] Read before the Massachusetts Board of Agriculture in 1877.

of a foot, is liable to be moved with every changing wind, says: "The tree best suited to this locality — and, there is good reason to suppose, to sandy plains in general — is the *Ailanthus glandulosa*.' With testimonials like these it is certainly safe to give the tree a fair trial. There is no soil so poor, and no situation so exposed, that it will not grow there. It is propagated as easily as the blackberry. A piece of the root the size of your finger when planted will produce a tree, and the seed, whether scattered on the surface, or covered with soil, will quickly germinate. One objection to the Ailanthus as an ornamental tree was its tendency to throw up suckers from its roots, and thus reproduce itself without limit, — a positive virtue when cultivated as a forest tree. Unlike the oaks and pines, it increases in size most rapidly during its earliest years. The perfect adaptation of the Ailanthus to the localities mentioned may be justly regarded in the study of the origin of varieties as an evidence of design.

In view of the foregoing facts, however imperfectly presented here, it is not easy to account for the general apathy found to exist on this important subject. Capitalists are eagerly seeking permanent investments promising not more than three or four per cent per annum, while the industry we advocate pays a better dividend, and in every instance has proved financially successful. One of the motives which prompted Mr. Pratt to plant his grove, he says, was, "that he might be remembered pleasantly by those coming after him." To this must be added the genuine satisfaction of having contributed to increase the wealth of the country, at the same time clothing the sterile hill-side with verdure. This is, in itself, a dividend, which, though not contributing directly to swell the cultivator's bank account, nevertheless possesses a value not easily overrated.

Discussion.

William C. Strong was called on, and said that it was a very great surprise to him that the people of Massachusetts do not cover their barren hill-sides with trees. He knew a sand-bank in which there was apparently not a particle of organic matter, where a gentleman, living opposite, planted white pines, which are now growing thriftily, and present a much pleasanter appearance than the naked sand.

At the meeting two weeks ago we were told that the early settlers of New England complained of drought, and the con-

clusion was drawn that they suffered as much as we do from that cause, and that the climate has not been affected by cutting off the primeval forest.

The first settlers did not cultivate as deeply as is done now, and so had not the protection from drought which deep cultivation affords; and it does not follow that the climate has not been modified. The rainfall and thermometer might not show much change, but the speaker thought the more delicate test of the hygrometer would. Streams flow more rapidly and are of briefer duration than formerly. In Maine lichens flourish on trees more generally than they do here, showing a moister atmosphere; here they are found only in swampy locations. Mr. Strong hoped that the lecture would be of practical benefit. On some farms it would be better to devote half the ground to trees and spend more time on the other half than to attempt to cultivate the whole.

Joseph Clark said, in answer to an inquiry how much shelter is necessary for white pines on the sea-coast, that it is more difficult to cultivate them on the side of a hill next the sea than on the sheltered side; but he thought they could be established, especially when planted thickly. The Austrian Pine is the best for planting on the sea-coast, though the Scotch Pine is hardy there. The White Pine will flourish six hundred feet from the ocean.

Edmund Hersey thought that the paper read covered the ground very well, but there was one tree not mentioned — the Red Cedar, — which, in his judgment, might take the place of the Pitch Pine on the sea-coast. It will grow on the poorest land, where grass will not grow, and will stand the ocean spray and even the wind on the ocean bluffs. He did not believe the Pitch Pine ought to be encouraged, and would cut it down as soon as he could find anything to take its place. It will cover poor land, but the Red Cedar will do so nearly as soon. The *Salix purpurea* (Purple Willow) will grow on high, sandy land, and in four years will make excellent hoop-poles; and the speaker thought it would be more profitable than pine. He did not approve the recommendation of the essayist to plant white birches among white pines, but would plant the pines thickly enough to shelter each other. The birches would crowd out the pines.

Mr. Hersey did not think we are suffering greatly from cutting off forests, but did think we ought to attend to tree planting. We do not train our forests so that they will be most profitable; we

do not leave the good seedling trees and thin out the poorest ones, as we should do. If our fathers had done this we should have better trees than we have now, and we should do it for the sake of coming generations.

John Robinson said that in planting trees we should not overlook those most in demand for timber, such as the Butternut, White Oak, Chestnut, and White Pine. The wood of the Red Pine (*Pinus resinosa*) resembles that of the White Pine so closely that it is difficult to tell them apart. This tree is most desirable for its beauty; it resembles the Austrian Pine, but is preferable as being a native species. Foreign species which are worthless here frequently have valuable native counterparts. By taking cuttings of the Ailanthus from female trees we can avoid the objectionable odor. There are many trees which will thrive south of Cape Cod which will not succeed north of that peninsula, as we know the Cape Cod plants flourish in Long Island and New Jersey and along the Southern coast. He had seen the *Salix purpurea* growing wild at Beverly within a stone's throw of the ocean, and the *Salix alba* at the exposed "Salem Neck," as healthy as in the interior. In the white pine woods along the Beverly shore there are trees two feet in diameter, where they have the protection of other trees, and but a few hundred feet inland they thrive without such protection.

Professor Robinson did not agree with those who thought that pruning forest trees is going to injure them, but it must be done properly, as in Europe, where forestry is a science. There a man goes round with a billhook, and cuts the limbs off close, and covers the wound with coal tar. The best time to do this is in winter, when the trees are dormant, as the growth is not checked then, and as soon as the tree begins to grow the wound will begin to be covered. If the pruning is left to nature there will be innumerable pins several inches long, each of which will make a knot in several boards when the trunk is sawed up, but if cut close only one or two boards will be affected.

It is evident from the Census Report on Forest Trees that our Western forests are being destroyed with fearful rapidity, and that ten or twenty years hence Chicago will not be the great lumber market it is now. The same reckless destruction is going on at the South, and along the Pacific coast, though we may be improving in New England. Just such meetings and discussions as this are necessary to awaken the people to the need of tree planting

and protection, and make them understand that we must have laws for the protection of forests.

J. W. Manning said that the Red Cedar is an excellent tree for bleak places, and is easily transplanted. He had set out ten thousand, of which not one in ten died. He thought the lumber supply is improving in the White Mountains. Fires destroy more wood than cutters, and are fed by the waste, rotten trees left by the lumbermen; but there are no Norway Pines among these, for they do not decay at the heart.

Fire is one of the most difficult things to deal with; one lumber man estimated that it does a hundred times as much damage as the axe. Sometimes the soil is composed of spongy vegetable matter to the depth of two or three feet; the trees root all through it and if it is burnt off trees will never flourish there again. He had seen white pines five feet in diameter where the soil below looked like ashes.

Asa Clement said he had been much interested in Mr. Slade's paper, and concurred in almost everything he had said. He spoke with regret of the noble White Oaks once common in our forests, but now exhausted, having been used for ship-timber. They were dug up to get knees for ship-building; the carpenters would bring patterns to get such as were wanted. He has White Oaks and Hickories which he has been nursing for forty or fifty years. Some manufacturers have to send hundreds of miles to get such timber as they want. In cutting firewood for the Lowell market his practice is to cut clean, and leave the stumps to sprout, as hardwood trees will do if not too old. He hoped that such discussions as this would arouse men to care for the timber they have, and to provide for the future, and not destroy trees for the sake of destruction.

Mr. Strong could not agree with the recommendation of some, to prune in summer. It is true that the wound will be covered sooner, but the shock to the tree from taking off large limbs is much greater than when the tree is dormant.

William H. Hunt said that the question before the meeting is a very important one. There is a difference between the situation here and that at the West. Taking the country as a whole the forests are disappearing, but here they are increasing. In New England there is much land not profitable for cultivation, on which much labor has been expended that has been substantially thrown away, — land so stony that no one ought to have attempted to

cultivate it. Many acres of such land are now growing up to wood, and if left to nature will inevitably gradually work into forest. He has a farm which contains a pasture of about fifty acres, where such a change is going on, and he assists it as far as possible. The best thing that owners of rough pastures can do with them is to leave them to grow up into forest, and help the process a little. A little care to exclude cattle will be well repaid, for the food they get from them is not valuable, and if the injury to the forest is reckoned, the food obtained will not balance it. The White Pine is the best tree for such pastures as have been mentioned: the lumber is always in demand. The trees which have grown up in this way have been mostly cut off at an early age, and little has been left to grow into large timber. The speaker had a black walnut tree two feet in diameter, which he cut down, and which made considerable lumber for the inside finish of his house. He had found the black walnut difficult to transplant; he had tried trees two or three feet high, and they had lived, but had not made a rapid growth, — not as much as he expected.

Mr. Hunt agreed with Mr. Strong that the climate has changed here as a result of cutting off the forests. The culture of the early settlers was not as deep or as complete as ours is now. He thought that the planting of trees in the West would bring about a change in the climate there.

Mr. Hersey's experience had been that black walnut trees are not difficult to transplant.

Mr. Strong thought that generally it would be better to procure seedlings of forest trees than to sow seed. The seedlings can be bought very cheap of nursery-men. Young White Pines can be picked up in the woods without cost.

J. W. Manning said that the Red Pine is very abundant in some localities. It is adapted to peculiar soils, where rye will not grow. At Fryeburg, Me., there is a forest of these trees 80 feet high. There is a Black Walnut in Saugus almost 5 feet in diameter, and one in Billerica 12 feet in circumference. The black walnut is easy to transplant.

Col. Henry W. Wilson thought we could easily satisfy ourselves that raising forests is a good thing; but there is little inducement to do it here, for it offers a temptation to every loafer to go through the young plantations with a gun and dog, spreading destruction by fire. Col. Wilson alluded to the associations connected with trees, and the love entertained for them; they are a source of satis-

faction to the planter and his children. It is good to encourage the planting and growth of nut-bearing trees; the right to their fruit can be enforced. Many of them, like the Hickory and Chestnut, are difficult to transplant, having long tap-roots; which are a source of vigor of growth; and the best way to raise them is to put a nut into the ground wherever a tree is wanted. The black walnut tree will grow here, and makes the most valuable lumber, good boards being worth $125 per 1,000 feet; but it is a tree to grow for 100 years hence; it requires 50 years to grow, and 50 more to solidify and mature. A tree 50 years old has not half the value of one 100 years old.

The speaker called at a place in Hampden county, which afforded an illustration of what a farmer can do by caring for a wood-lot. In a 40-acre lot on this farm the thinnings last year comprised 500 chestnut railroad ties, which sold at from 50 to 60 cents each. Basswood, in some places, brings $8 per cord, for paper stock. We must study the growth of trees, and the soils and markets, and adapt them to each other. There is an exigency for applying a system of forest planting to whole districts in New England. In the best farming districts there are abandoned farms, within 65 miles of Boston, where not a spear of grass grows that is of any use to man, and the only thing to be done is to let them grow up to wood.

Hon. Marshall P. Wilder, who had just come in, was called on, and said that he had heard only Col. Wilson's remarks, which he fully approved. We have a great quantity of land in New England which can be made productive only by planting with trees. There are still immense quantities of timber in Alaska, Oregon, and Mexico, which will afford supplies for a long time to come. The necessity for planting forests in New England has been overlooked, but a spirit is now abroad which is arousing the people to its importance, and he thought we should not realize the fears which have been entertained of the exhaustion of the supply of lumber, and of other evils arising from the destruction of our forests.

It was announced that on the next Saturday Edward L. Beard would read a paper on "Herbaceous Plants *vs.* Bedding Plants."

BUSINESS MEETING.

SATURDAY, January 24, 1885.

An adjourned meeting of the Society was holden at 11 o'clock, the President, JOHN B. MOORE, in the chair.

Hon. Marshall P. Wilder announced the decease of the eminent pomologist, Charles Downing, of Newburg, N.Y., a Corresponding Member of the Society, whose life had been most useful, and whose death was a great loss to the country; and moved that a committee be appointed to prepare memorial resolutions. The motion was carried, and the Chair appointed as that Committee Mr. Wilder, William C. Strong, and Robert Manning.

Adjourned to Saturday, January 31.

[Here follows, at Vol. 5, page 208, of the Society's Records, under date of January 28, 1885, the record, directed by vote of the Society on the 4th of October, 1884, to be made, of the enclosing of the Society's land on Bromfield and Bosworth streets, but it is not deemed necessary to print it. It is also recorded with Suffolk Deeds, lib. 1664, fol. 146.]

MEETING FOR DISCUSSION.

HERBACEOUS PLANTS VS. BEDDING PLANTS.

By EDWARD L. BEARD, Cambridge.

Probably most of those gathered here are quite familiar with Hardy Plants and their attractive features; but a keen faculty of observation on the part of the horticulturist is not requisite for detecting the fact that in every quarter, — in the small garden, as well as in the gardens of the more favored, what are popularly known as bedding plants have so far usurped the place of their less obtrusive relatives, hardy herbaceous plants, that the latter are, to a large extent, unappreciated, because forgotten and unknown. These remarks apply not only to hardy plants but to some beautiful things not altogether hardy, but such as the gardener whose love for his profession rises above the mere drudgery often incident to its pursuit may, with the aid of cold frames and covering, protect through our trying winters with comparative ease;

being more than recompensed in spring and summer by the unique beauty of blossom with which some of the more tender species are favored.

I have set the two classes of plants — the hardy and the more tender bedding plants — against each other for our consideration and comparison. The latter includes the Geranium, Coleus, Alternanthera, Pyrethrum, Lobelia, and others, and depends for effects upon color and strong, often glaring, contrasts. That is to say, most bedding effects have these characteristics. Some combinations of bedding plants, in certain gardens, have these faults less obtrusively displayed, and often a harmony in the blending of colors is apparent, forming a pleasing picture in a wide frame of green, where distance and also perspective tend to soften, and at the same time to enhance, the effect of the contrasts. These effects, produced with bedding plants in combination with large and small succulents, aided here and there with the hardier palms and bromeliads as adjuncts to the whole, are noteworthy and commendable, bringing into play the utmost fancy, skill, and taste of the gardener; who each year seeks for new combinations of color and form. Such displays show favorably in certain locations, where they are but one feature among many others and do not wholly absorb the gardener's interest and attention.

But in this country, where gardening as an art is still something of a weakling, these pleasing horticultural pictures must necessarily be confined to the gardens of a few wealthy persons, who are fortunate enough to command the services of able gardeners whose taste is marked and preëminent. I would not have it inferred that all men of wealth are so favored, for in many instances I have known the master and the man, while intending to beautify an estate, to be joint partners in making it hideous and a complete exposition of bad taste and vulgarity, when in other hands it would have been made strikingly beautiful.

Bedding out, as generally practised by the amateur and gardener, is like the first attempts of a tyro in painting, — very crude and inharmonious. Ignorance of the character and value of plants, in their relation to the picture or mosaic to be formed, is, perhaps, the chief difficulty in these instances. In many, and, I may say, in most, places where a gardener is intrusted with power to fill up and arrange the beds for the season, will be found a yearly recurrence of the monotonous, never-blooming reds and yellows, with a few inconspicuous and dingy intermediate colors, which, in our

summer droughts or in heavy rains assume a forlorn aspect, upon which the curtain is abruptly dropped by a sharp frost early in the season, after which the gardener, though no doubt weary of the monotony, sets himself to work to propagate plants and otherwise prepare for the next summer's three months' panorama of color. This preparation, considering the work involved, is one of the strongest arguments against the bedding-out plan of gardening as practised in places where the ordinary greenhouse is maintained. Most greenhouses are expected to furnish a supply of flowers in winter, but it is evident that in many of them the bedding plants come in for more than their rightful share of space, crowding out flowering plants and overtaxing the gardener, who is made responsible for a regular supply of cut flowers from the time that frost sets in until the garden can be again drawn upon. I have heard complaints made of short floral supplies in winter on various occasions and in quarters where this onerous system of bedding out and not the gardener was justly to be held accountable. The latter will therefore find it for his own interest to aid in revolutionizing methods and tastes which are the outcome of indifference or ignorance. A more general insight into the beauty and adaptability of hardy plants and bulbs, and a more practical study of their habits and requirements, on the part of the gardening craft at large, would ultimately lead up to such an expansion of beauty in our garden borders that the wearisome round of bedding out and the monotonous recurrence of its short-lived display would become, not obsolete, perhaps, but would have a wholly secondary place, at least, subordinate to the more refined and satisfying culture of hardy plants. Kobusia, in "The English Flower Garden," page 1, p. xxxiii, says: "The sacrifice of flower gardens to plants that perish every year has led them a part of all the other pleasures — has, in fact, caused the expenses of the garden to go to purposes which result in the end of every flowering season almost generally devoid of life. We here take into account the increased, the propagation of plants by thousands at certain seasons, the planting out at the hottest and driest time of the year — in May or June, the re-use necessary digging up and storing in autumn, the care in hot and dry structures in the winter, the hardening off, etc. Now expenditure should go towards permanent arrangement and planting and that for the best possible reason, — that very often the best things of our gardens . . . do not really cost a few a sum that any cottager would grudge."

In our brief summer the display made by bedding plants falls short of three months in duration. It requires at least a month for plants taken from propagating houses or cold frames to establish themselves when transferred to the open ground, and even more than this time elapses before they have grown into form, and developed color of leaf or blossom, sufficiently to make effective contrast or display; and, as already intimated, the first sharp frost relentlessly nips off leaf and blossom when at their very best. The friends of bedding out claim for their society a lasting beauty through the season; but is not lack of that to pronounce them? Month after month, and year after year, we have the same stereotyped style of display, until the eye tires of it and interest flags. What is needed in its place is diversity of form, and artistic combinations, which may attract the attention and gratify its taste. Let us much-used season with its flowers and enjoy them in their order, and our interest and pleasure will become more marked and satisfying with each successive year. Our attention will be directed to new resources, hitherto unappreciated or unknown, for in the realm of horticulture there appears to limit to fruitful investigation and experiment.

A well-known writer, summing up the contrast between hardy and bedding plants, says, "There is nothing whatever real in bedding out to be compared in any way — in color, scent, size, or bloom — to specimens belonging to many families of hardy plants now obtainable. There is no beauty found among bedding plants that is anywise comparable with that of Lilies, Irises, Peonies, Delphiniums, Narcissuses, and a host of others. Are we to put aside all this glorious beauty, or consign it to a second place, for the sake of the comparatively small array of plants that afford merely leafs and belts of color? Let those who like bedding plants enjoy them; but no one who knows what the plants of the northern and temperate regions are can admit that their place is a secondary one."

I might pursue this subject further, and reason from an exclusive stand-point against the artificiality of bedding out, and its violation of artistic principles, independently of its practical disadvantages; but as we have to deal with practice rather than theory, I rather think I attempt to show how many beautiful, and to most people unfamiliar, plants can be used to decorate our gardens and grounds, of which the great majority are barren wastes, compared to what a little knowledge and taste might make them.

Indifference and ignorance, in relation to the higher details of gardening, are so general that it will not be possible to revolutionize them in a day; nor shall we see a decided increase in horticultural taste and refinement until lapse of time, and further growth in civilization, shall have afforded those opportunities of research and experience which are needed to teach all the beautiful possibilities of floriculture, and shall have demonstrated to us that among the fruits and flowers may be found delights, which, once tasted, will never be willingly forgotten or relinquished.

But a hopeful augury for the future appears in the rapid and unprecedented increase of popular interest not merely in the outward forms and varieties of plants, but in their culture, development, and improvement as well. Within ten years amateur and professional horticulturists have originated many striking novelties and improvements in popular flowers, and we already see our seedling roses, chrysanthemums, and carnations sent abroad to grace the pages of foreign catalogues. All this marks decided progress; mostly, it must be confessed, confined to the professional grower, but with such a start we have every reason to hope that in this great country, with its varied climates, we shall yet develop a circle of skilled amateurs, who, while they may not outrival such men as Ewbank, Maw, Horner, Ellacombe, Wilson, and many other noted Englishmen of the same class, may at least achieve sufficient success to have their names, and the results of their labors, similarly esteemed. The present list of American amateurs, who devote their attention with any marked results to the improvement and development of the floral world, is a very small one; and it will remain so until we find our gardens filled with a more varied selection of plants, and until a greater general knowledge concerning them shall have been diffused, through the influence of such organizations as this Society.

When I undertake to advocate, against the popular and well-known system of bedding, a resort to the great family of comparatively unknown hardy plants, and bespeak for them consideration and cultivation, it is not with the hope or expectation of any immediate general revolution in practice, but rather of inducing some few to give up their beds of scarlet Geraniums and gaudy Coleus, and find new pleasures among the Lilies, Narcissuses, Irises, and the thousand and one other beautiful members of the hardy family.

My remarks are directed more especially to the possessors of small gardens, — those little plots of ground scattered in all

directions about us, — the majority of which at present have no attraction in summer but a few starved and ill-appearing plants, brought from the florist, and left to themselves and the family cat; and permitted, like the latter, to run wild at their own convenience. Under these conditions it is no wonder that many people who can afford to have a garden, and who tell you they enjoy flowers, attain no real success, and gradually lose interest in their flower beds, until weeds and grass blot out even their first attempts at gardening.

To be a successful horticulturist one must have a competent knowledge of his subject; and this, like all things where success is desired, requires effort and study. Such knowledge once gained opens the way to easy methods, and the discouragements which attend the first developments of horticultural taste give way to the certain consummation of all that is undertaken. Knowledge brings new delights in the garden, and what once seemed impossible to achieve, becomes not a task but a pleasure of absorbing interest. Drudgery ceases to be drudgery because of a certainty of accomplishing all that is undertaken. I think all will agree that this is the secret of success, and that those who are willing to learn through patient study the habits and requirements of everything which takes root, grows, and blossoms, have no reason to doubt the result.

My suggestions so far have been mere in the abstract than in the concrete; and I will now turn from any arguments for or against the favorites of different cultivators, and consider how our gardens may be made beautiful by the culture of hardy plants.

It is useless to hope for success without, at the outset, making reasonable preparation for the growth of these plants. Most of them are deeper rooting than bedding plants, and therefore the beds for their reception must be trenched or spaded to a depth of two feet, and well manured. Most herbaceous plants are good feeders, and require good soil. Beds must not be located under trees, where the roots of the latter can impoverish the soil. Many of the failures in the cultivation of these plants are due to neglect and consequent starvation, and the grower, discouraged by his indifferent success, pronounces them worthless, when, on the contrary, had he given them due attention at the proper time, they would have proved themselves worthy of all the care bestowed on them.

Robinson says, in this connection, the idea that, once these

hardy plants are planted, they will go on satisfactorily for many years without any further cultivation is one of the greatest delusions possible; for, unless the soil in which they grow is kept in good order, the vigor of display and of bloom ceases to be what it should, and the whole thing is a failure; still it must not be inferred that they require the attention of yearly transplanting. An annual top-dressing of well-rotted manure, or leaf mould, is a great aid to most hardy plants, but they dislike the spade, and ought not be dug about, except when lifted or divided. It is well to let the leaves which fall upon herbaceous beds remain there during the winter, this natural covering and nutrition proving beneficial.

A large proportion of this family is greatly benefited by being lifted every few years, and divided and transplanted. Pyrethrums, Phloxes, Delphiniums, Narcissuses, and the rest, all feel the good effect of transplanting and division at intervals of two or three years. Many make rapid growth and form large clumps in the ground, and these can be lifted and divided in early spring, before active growth begins, and successfully transplanted. This facility is a benefit to the grower, who can increase his stock without cost, and contrasts favorably with the constant labor and expense requisite to keep up the stock of bedding plants, the propagation of which, even where the facilities exist, is, as I have shown, a serious tax upon time and space.

One of the favorite arguments used against the cultivation of hardy plants is that they do not give continuous bloom through the summer, and that the beds containing them are not as showy as those which afford a mass of color, like those filled with geraniums or petunias. This is very true where no provision is made for a succession of bloom by selecting such varieties as come into bloom at different periods in the year. The intelligent grower, however, does not make this mistake; and here it may be said that the greatest loss under the bedding-out system is that of the blossoming in spring and early summer of Tulips, Scillas, Grape Hyacinths, Narcissuses, hardy Primroses, Saxifrages, Irises, Fritillarias, Globe Flowers, Crocuses, and hosts of other choice plants and bulbs, rarely seen under general cultivation.

Our list of spring-blooming hardy plants and bulbs would be greatly extended could we include the varieties which are hardy in England, but whose endurance through our trying winters is uncertain. Cold frames, therefore, should be utilized for this class,

and a more general use of these conveniences should be favored. In them, Violets, Anemones of all the early-blooming kinds, Forget-me-nots, Primroses, Hellebores, Hepaticas, Pansies, and many other beautiful things can be grown to greater perfection than in a greenhouse. It only needs that the possibilities of frame culture should become fully known and understood to insure to the amateur who lacks a greenhouse the greatest success with the class of plants I have named. With frames open to the sunlight, and protected by the usual methods, one may have flowers in plenty from January till June. The Pansy, which is everybody's favorite, is rarely seen in perfection except in a cold frame.

The arrangement of hardy flowers in the garden affords so much scope for taste and knowledge, that it would require a volume to make plain the numerous and various phases of grouping that may be devised with an eye to effect and continuity of bloom. The landscape gardener, in laying out lawns, etc., endeavors to form groups of trees and shrubs of contrasting habit of foliage, through which pleasing vistas for the eye may be open. Only the inexperienced will proceed to dot in here and there an individual tree or shrub, which, by its isolation, loses its effect. We must carry this idea into the flower garden, in our arrangement of hardy plants, so far as it relates to the grouping of a number of one species or variety by itself. A hundred Daffodils growing gregariously is a much finer sight in bloom than if the same number were scattered or dotted over the surface of a bed, and by carrying out this idea with all the dwarfer plants, much better results are attained; and we can extend it, if space permits, in combinations of hardy flowering shrubs, the use of which I favor most decidedly in forming our beds of hardy flowers.

We have few dwarf shrubs like the Hollies and Yews of England, which, with their shining foliage, are such additions to flowering beds there, but in place of the latter we can use, for the backs of such beds as rest against a wall or fence, and for the centres of beds which stand upon the lawn, the dwarfer hardy Rhododendrons, the Kalmia, Barberry, *Spiræa Thunbergii*, *Hydrangea paniculata*, and here and there some of the stronger growing roses, which seem to have been supplanted nowadays by the more delicate and tender exhibition sorts. The latter, for general display, cannot be compared with varieties like Mad. Plantier, Harrison's Yellow, and many of the climbing roses, like Baltimore Belle which, though a climber, is a most beautiful sight when left to

scramble over a slight support in a bed or border. The Japanese *Rosa rugosa* and the white variety are two of the finest plants that I know of for use in such a bed as I contemplate. Both have dark, shining, and persistent foliage, which is not subject to insects, and the blossoms and hips, especially of the red variety, must be seen to be appreciated. I may also include hardy Azaleas, the Japan Quince, Viburnums, Weigelas, Andromedas, etc.; but I hardly need to give an extended list of those appropriate for the purpose I have named, as they are perhaps better known than the herbaceous plants. No bed, however, can be made quite effective without them, and they take on new beauty when combined as I have suggested. I refer to them as valuable additions necessary to the effect in planting. In small beds, a specimen of this class here and there breaks the level and relieves the eye as to general effect, besides affording bloom, and in larger beds the dwarfer kinds, two or three of each, may be planted together, at intervals. There should be no crowding, but ample room should be left between them for colonies of hardy and dwarfer plants.

In conjunction with the shrubs may be planted the taller and more robust members of the hardy family, but so that they shall not be unfavorably dwarfed and overgrown by the former. Among these are the broad-leaved Funkias, or Plantain Lily, the best varieties of which are *ovata*, *Sieboldiana*, *grandiflora*, and *subcordata*, all of which are bold and graceful, lending a tropical effect, and they are quite hardy and vigorous. The Hemerocallis, or Day Lily, is another graceful and strong-growing plant which looks well grouped with shrubs. Among the best species are *Thunbergii*, *Kwanso plena*, *disticha plena*, and *flava*. To these may be added the Delphiniums, which are taller growing, and may be planted, in groups or isolated, among the shrubs. By this I do not mean under the shrubs, but at distances affording room for growth and development, without either wasting room or overcrowding. There are so many beautiful varieties of these that no collection is complete without them. Some of the newer kinds throw up spikes of bloom nearly three feet in height, and as regular in form as those of hyacinths. The Delphinium, by cutting down some of the flower spikes, can be kept in bloom up to frost. Another valuable plant to combine with these is *Galtonia candicans*, formerly known as Hyacinthus. This has proved to be quite hardy; and, while isolated specimens are not so noticeable, a

group of them, with their bold spikes of white wax-like flowers, is a sight which commands attention.

In such beds nothing is finer among the taller plants than the Clematis, trained loosely to a light support, or, what is better, left to climb over the taller roses, with the blooms of which it affords a fine contrast. Among these *Jackmanni*, *Fortunei*, *Flammula*, and some of the hardier of the hybrids are best. *Clematis coccinea*, especially, looks best grown in an open bed, and left to itself to find support on neighboring plants. It has a scrambling habit, but it is a beautiful object when in perfection. Another plant seldom seen, and yet worthy of a place in every garden, is *Lathyrus latifolius*, the Everlasting Pea. There are three varieties of this, which I have seen, — *grandiflorus*, a bright scarlet; *albiflorus*, the white; and a striped variety. This splendid perennial loves to be undisturbed, clambering over any support near it, and flowers incessantly, especially if not allowed to form seed. Its flowers are especially adapted for cutting, and last long after being cut.

Among the herbaceous plants none are more striking than the Campanulas, and no bed ought to be without them in variety. There are many dwarf and Alpine species, which are particular as to location, and need especial care, but among those which are robust enough to flourish in the border are *Carpatica*, *persicifolia*, and the double variety of this, both white and blue, and Van Houttei. *C. glomerata Dahurica* is one of the finest, but I do not know whether or not it is hardy here. These are dwarfer plants, all good for cutting, and I would favor their being planted in groups of two or more. As companions to these, and among the finest of all hardy plants, are the double and single Pyrethrums. When once established, they form strong clumps, and are profuse in bloom. The double kinds most of us have seen on exhibition here, but they are generally unknown except among amateurs, who are familiar with their merits. I know of no choicer flower for cultivation in the garden, where cut flowers are wanted. They are as desirable as the Chrysanthemum, and there is a delicate refinement about the flowers, as well as diversity in color, which ranges from pure white to brilliant shades of scarlet. They are quite hardy, but like good food and occasional division. The single ones I do not so much fancy, though good colored varieties are very striking. With a stock of these in the garden, few would wish to exchange them for bedding plants.

Among other good things are the white and red *Dictamnus Frax-*

inella. Both this and the Campanulas and Pyrethrums grow to about the same height, and can be grouped harmoniously. Among the taller growing perennials for centres of beds, Phloxes form attractive masses of color, and the later hybrids are so bright and vivid that a group of them here and there holds the eye, while their habit is favorable for use in small beds. They are more attractive when used in combination with other plants than as isolated specimens.

Then we have the Lilies, a family altogether too little known and understood. They can be planted among the Rhododendrons and taller shrubs, where their heads of bloom will shoot up in their respective seasons with an appropriate background of green, that adds very much to the effect. The protection thus afforded them is valuable, and in a well-made bed the majority of the more robust are certain to thrive. All lilies look better in groups than as single specimens. The old Tiger lily affords one of the most charming bits of color when left to multiply and bloom in masses in conjunction with other plants. *Lilium candidum*, *Martagon*, *umbellatum*, *longiflorum*, the varieties of *speciosum* like Melpomene, *præcox*, *rubrum*, and others, are among the best. *Lilium auratum* is one of the finest species, but cannot be depended upon to thrive for any length of time in most locations.

The Tritomas, with their flame-like flowers, are fine autumn-blooming plants, and when a mass of them comes into bloom in September they light up the garden with their orange and yellow spikes, which resemble, in their gradation of color, a red-hot bar of iron. They are hardy in England, but not so here, and have to be lifted, and stored in a cool place secure from frost. They require so little trouble, however, that any garden of hardy plants ought to include them, especially as they bloom in connection with the Japanese Anemones, of which the white variety known as Honorine Jobert, especially forms a splendid contrast with the Tritomas. What can be finer as a garden plant than this, with its masses of pure white flowers, larger than a silver dollar, with yellow stamens? And yet it is not generally seen, though it has been introduced for some time. Both this and the rose colored variety are hardy, and should be planted in quantity. They blossom until the frost cuts them down, and are among the latest out-door flowers we have.

The Irises can be used to great advantage in mixed beds, and their magnificent flowers, often comparing favorably with the

Orchids, command general admiration. With a few exceptions, they are strong growers, and multiply rapidly, most of them blooming in early spring and summer. The varieties are numerous, but *Persica*, *reticulata*, and the English, Spanish, and German species are among the best for general use. The last-named species is robust, every shade of color will be found among its varieties, and they are unparalleled in beauty. Hybridization has produced a large number of greatly improved varieties, which can be purchased at reasonable cost and made most effective in the garden. The Japan *Iris Kæmpferi* is even more gorgeous than any of its fellows, and if it could be relied upon in the border, it would not have a peer in the family to which it belongs. Our dry summers, however, are unfavorable to it, as it likes a moist situation, partially shaded. We have seen how Mr. Parkman has produced new seedlings of this, which rival any of European origin, and, with plenty of water in summer, and protection from too much stagnant moisture in winter, we ought to make it thrive as he has done. It is worth the effort to establish it in mixed beds. I have known some varieties to produce flowers ten inches across. There are many other gorgeous species and varieties, but these will suffice for general use.

No collection of hardy plants would be complete without the Pæonies. They are stately and noble in growth, with fine colors, and the huge flowers of many of the varieties are fragrant. Both the single and double forms of the Tree pæony (*Pæonia Moutan*), are fine, and they are the first to bloom but they are of tall growth, and for the mixed bed are not as useful as the herbaceous kinds, hybrids of *P. officinalis*, crossed with such varieties as *albiflora*, *Sinensis*, and *edulis*. From these have sprung magnificent forms embracing unequalled colors. An extended list of named varieties is given by English and Continental growers, and by some of our own nurserymen. Some are inclined to speak contemptuously of the Pæony, associating it with antiquated garden flowers; but a knowledge of the great improvement effected by hybridization will suffice to change this into admiration. *Pæonia tenuifolia flore pleno* is a dwarfer kind, but one of the most striking, resembling a large rose of vivid color.

Another good thing, not well known, and a striking object in the garden, is the Double Sunflower (*Helianthus multiflorus flore pleno*). This must not be confounded with the tall sunflower. On the contrary, it is dwarf and compact, bearing vivid yellow flowers,

quite double, and about the size of a Dahlia. It is not so formal as the tall kind, and is very useful for cutting.

The Poppies embrace some varieties worthy of culture everywhere. Those of us who have seen a mass of *Papaver orientale* know what a brilliant thing it is, with its immense, fiery-scarlet flowers, six inches across, marked with great blotches of black. This, with some of its varieties, such as *bracteatum* and *concolor*, should be used as positive colors in arranging our beds of hardy flowers for effect, and there are few things that could take their place.

The Aquilegias, or Columbines, we cannot ignore. Some of them bear most exquisite flowers, and are of graceful habit. *A. cœrulea*, *Skinneri*, and *chrysantha*, with quite a number of hybrids, are the most noticeable. *A. glandulosa* is perhaps more striking than any other. A bed of it which I saw last summer was bewitching in its beauty. Unfortunately it is not certain to thrive in this climate, having Alpine characteristics.

Among the most useful plants for grouping in the centres of beds are *Anchusa Italica*, *Gypsophila paniculata*, *Lychnis Chalcedonica plena* and *Lychnis Viscaria plena*, the perennial Lupines, Foxgloves, *Rhexia Virginica*, Trollius or Globe Flower, *Asclepias tuberosa*, some of the finer hardy Asters, among which are very beautiful forms, — *Coreopsis auriculata*, *Corydalis nobilis*, *Dianthus barbatus*, or Sweet William, in its many varieties, *Dicentra spectabilis*, some of the more robust Saxifrages, and *Tricyrtis hirta*. Lack of space forbids further detail, though I should like to name and consider very many other attractive species, not generally known. I have endeavored to name the species and varieties which should form prominent features in the hardy garden. The grower of long experience can name many more equally beautiful, but, in the limited space afforded me, this must suffice, as I wish to speak of the hardy bulbs and dwarfer spring-blooming plants, which, after all, are the delight of the garden. These come before summer's withering heat and drought, and, following so soon on the retreat of winter, we can more keenly appreciate the wealth of blossom they afford. Having filled the centres and backs of our beds or borders as I have indicated, let us plant in the foreground, among the dwarfer perennials, as many hardy bulbs as we can afford to purchase and can safely locate.

First and foremost are the Narcissuses. They do not need the praise of any one to make them favorites. Those I will name

are hardy and easy of cultivation. There is an infinite variety of them, presenting slight variations in form and color appreciable only by the expert, but the following are distinct, and will give the best results. All of them, as well as the other species of bulbs that I may name, can be found in any English, and in a few American, catalogues: —

Narcissus bicolor Horsfieldii;
" " Empress;
" " Emperor;
" *maximus;*
" *obvallaris*, or Tenby Daffodil — a splendid flower;
" *incomparabilis* Stella;
" " *plenus;*
" " *aurantius plenus;*
" " *sulphureus plenus;*
" *poeticus ornatus* — the best of this group;
" " *plenus;*
" *cernuus plenus;*

It will pay to plant Narcissuses in well-prepared soil, and give them yearly dressings of manure. The best time to lift and divide them is in August, when they are completely at rest.

With the Narcissuses we can associate in groups *Scilla Sibirica*, of the most brilliant blue, which looks at its best when planted in clumps of a hundred bulbs or more; also *Scilla nutans* and *S. campanulata*, which bloom later; and *Tulipa Gesneriana elegans* and *T. Greigi*, all magnificent species. These are hardy, and do not need to be lifted yearly, like the early Tulips. They are, moreover, far more graceful as garden flowers.

With them we can associate some of the long-stemmed Tulips, which seem to have gone out of fashion along with the queer but striking and artistic Parrot Tulips. Here and there can be planted Crocuses, including *C. speciosus*, *C. serotinus*, and *C. sativus*, and near them the seldom seen autumn-flowering Crocus (*Colchicum autumnale*). These are all invaluable, the flowers being large, showy, and abundant.

Adonis vernalis, a dwarf perennial plant, which sends out its bright yellow flowers almost before the snow disappears, may be associated with these. *Chionodoxa Luciliæ*, or Glory of the Snow, is a brilliant spring-blooming bulb, somewhat akin in habit to

Scilla Sibirica, and with cultivation may excel it; but to my fancy the latter is the brighter and better of the two, besides being much less expensive. With such dwarf-flowering varieties as I have named it is appropriate to plant the Snowdrops (Galanthus) and Grape Hyacinths (Muscari). Of the former, in addition to the type, may be named *Elwesii*, *plicatus*, and *Redoutei*. These are much finer and more distinct than the type.

The Muscari are little known, but they form attractive groups and are fragrant. *Atlanticum*, *botryoides*, and *moschatum* are the best adapted to this purpose. We cannot include the spring-blooming Anemones, and it is a pity, though nothing is finer for cultivation in cold frames with Pansies.

The quaint Fritillarias, Colchicums, and Winter Aconites should be used, and, where there is room, by no means forget to make plantations of Lily of the Valley. How often we see this starved, and often running out, when good culture would achieve the best results! It is exceptional to see it in vigorous cultivation. The mat which it forms should be broken up and thinned out from time to time, and the crowns should be top-dressed yearly with fine manure. It then takes on a different aspect, the spikes of bloom reaching twice the size of those from the starved plants. It is improved by being planted in open situations rather than under trees, as is generally the rule.

In these beds can be dotted here and there groups of Pansies which have been wintered in cold frames; and Primroses of the hardy type can also be used with the best effect. Our winters are too severe for Pansies and Primroses to thrive continuously out of doors, and a cold frame will be found a great help to those who cultivate hardy flowers.

Those who have gardeners, and those who have not, will find the care of a few cold frames involves comparatively little trouble, and in them can be wintered many interesting half-hardy bulbs and plants, like *Narcissus Bulbocodium*, *Geum coccineum plenum*, Hellebores, Violets, Pansies, and, last but not least, Pinks and Carnations. I do not refer to our Perpetual Carnations, used for winter blooming, but to the hardier border Pinks and Carnations, like Lord Lyons, Mary Morris, Mrs. Simkins, Blush Clove, The Governor, and many others. These can be safely wintered in a frame, in pots, and turned out into the open bed in spring, where, associated with the dwarfer plants, they are especially satisfactory and beautiful, furnishing cut blooms in abundance, of the most durable

and delightful character. They can be lifted again in the fall, and transferred to winter quarters; and they are easily propagated by cuttings or layers. Those who have once successfully cultivated this race of plants, and found out their proper treatment, will agree with me that they offset an entire garden of bedding plants.

The cultivation of such flowers as the Carnation, Anemone, Hardy Primrose, Polyanthus, Auricula, etc., is becoming better understood in this country. What seemed insurmountable obstacles to success, in the way of summer heat and winter cold, are overcome by the patience and skill of growers who give their attention to what they undertake. Hardy Primroses are not easy to carry through the summer in this climate, as the red spider has a fondness for them during the hot weather. I have four lights of them now in splendid condition, but they were wet with the hose twice a day during the warm weather, and that is the sole secret of success with them.

Where there are bare spaces in our beds, we have such bright and pretty, close-growing plants as the Sedums and *Phlox subulata* to cover them. Many of the former are hardy in this country, and bloom so profusely that they dazzle the eye with their pronounced yellow, which is the predominating tint. They thrive in any well-made and not over-moist garden bed, and ought to be more generally cultivated, which would be the case if they were better known. *Phlox subulata* is of dense and spreading habit, the rose colored flowers entirely hiding the plant, and forming a mass of color from three to six feet across in favorable locations. There are numerous other low-growing and creeping hardy plants, which should be freely planted in the hardy garden. They serve to greatly diversify the color of bloom and foliage, and are of great practical aid in keeping the surface of the ground cool and moist during the summer.

I have outlined in a very crude way my ideas about the hardy garden, confining myself to essential and prominent points, of use to those who have little knowledge of the subject. All of the plants I have named will give the grower a wealth of bloom from spring to fall, and the bed can be cut from again and again without injury, supplying flowers for the house, where, under the bedding system, there would be few, if any.

Those who desire to add to their beds of hardy plants, and are willing to take the trouble of lifting or renewing each season, may grow in them Gladioli, Tigridias, Asters, Dahlias, Scabious,

Antirrhinums, and any of the finer tender bulbs or annuals. They will certainly give added brilliancy to garden beds and repay all extra trouble. It is important to note that the culture of tender plants is made possible under the plan I propose, while the bedding system crowds out all other plants than those which are necessary to form the lines and masses of color; and this fact has been demonstrated by the gradual disuse of the finer, hardy plants.

All hardy plants can be obtained from such growers as Woolson & Co., of Passaic, N.J., who make a specialty of them; Ellwanger & Barry, of Rochester, N.Y.; and many of our own local nurserymen. The rarer varieties which cannot be secured here are supplied by Thomas S. Ware, of Tottenham; Peter Barr, of London; and others in England.

In this climate spring is the proper time in which to plant all hardy herbaceous plants, as distinguished from hardy bulbous plants. The latter, which are usually at rest in the fall, should be planted in October or early November. English growers recommend fall planting for all hardy plants; but there the ground does not freeze hard, if at all, and no injury is done to newly located plants.

With this last practical hint I will bring my outline of general ideas to a close.

There are many works on Hardy Flowers in which the interested reader will find at greater length the ideas I have endeavored to concentrate; especially in Robinson's "English Flower Garden" he will find the best thoughts upon this subject, which should be read and studied by every one interested in the culture of hardy flowers. Such study must surely lead all to a sense of the poverty and bareness everywhere exhibited under present methods, when we have at hand the resources of this and every other continent from which to draw together under our own eyes, and in our own gardens, the very *élite* of the floral kingdom, whose now unrecognized claim to our appreciation, dowered as they are with all that is graceful and beautiful, must and will, if we but consent to give them room and care, afford us unexpected revelations of the resources, the graces, the never-ceasing pleasures and joyful surprises to be found in our hardy gardens.

Discussion.

In reply to an inquiry as to what plant would make a good edging, Mr. Beard suggested the dwarf variegated Funkia; but he did not particularly favor edgings in gardens.

Mr. Beard went on to speak of the *Aquilegia glandulosa* as he saw it in the Botanic Garden at Cambridge, where nothing could compare with it. Most people make a mistake in transplanting their Narcissuses at about the time when frost comes and they have begun to grow. Those who have never grown Tulips have little idea of their beauty. *Tulipa Gesneriana* will stand as long as it is supplied with food. Crocuses should not be put into beds with a single bulb dotted here and there, but should be planted in groups. The speaker mentioned a garden, which he saw in Baltimore, over a hundred years old, and containing twenty acres, in which were great groups of flowers, such as we rarely see now; among others a mass of *Muscari moschatum*, twenty feet across, the fragrance of which was perceptible a mile away. There are no more beautiful flowers than *Anemone coronaria* and *A. fulgens;* they are cultivated in England as Pansies are here. Last spring Mr. Allan demonstrated that it is possible to grow Auriculas more easily than many other things which are more generally cultivated. Few people realize the fact that bedding plants afford the members of the household but little opportunity to go out and cut flowers.

William E. Endicott said that he did not altogether like edgings, but where they are necessary Sempervivums make the best. Almost any kind will do well for a great many years. The *Erysimum pulchellum* is a dense, carpet-like evergreen, about three inches high, which early in spring throws up numerous spikes of bright-yellow fragrant flowers, and is adapted for edgings. There are also annual species.

Warren H. Manning thought Mr. Beard's paper very interesting and instructive. The dwarf Phloxes deserve more attention than they have received. The light and dark varieties of *Phlox subulata* are very pretty in the border or rockery.

William C. Strong said that the essayist presented his paper in the character of an advocate. He threw all classes of herbaceous plants into the scale, and they outweighed the bedding plants; but the speaker thought we ought to be thankful for bedding plants. He admitted that they had been more popular than they deserved

to be, but he did not advise giving them up altogether. An essayist could say something in their favor.

John G. Barker said that his sympathies were in a large measure with the essayist. The speaker, as years roll on, is more and more impressed with the importance of cultivating herbaceous plants. Though we cannot discard bedding plants entirely, we should use them with discretion. In extending the grounds of the cemetery at Lynn, of which he is superintendent, he makes a special point of hardy trees and shrubs, and has lately planted two beds on lots owned by private parties.

He uses tender plants to fill vases, but thought we might find substitutes, and believes that we can in future create a taste for hardy plants in grounds of small extent. There are places in his own city where the owners, after spending from thirty to a hundred dollars a year for three or four years, for bedding plants, have become discouraged, and given up cultivating flowers altogether, and laid the ground down to grass. If the same amount of money had been paid for hardy herbaceous plants, the result would have been far more satisfactory. The speaker is fond of natural effects, which may often be produced at small cost, as in the cemetery at Lynn, where *Clematis Jackmanni* and Virginia Creepers were planted at the foot of a rough stone wall, which they have covered, and have cost no more trouble than weeding and cutting off the ends of the shoots. The effect is fine, and the expense was small.

He has a large bed covering the basement of his cottage, the background being composed of such shrubs as *Hydrangea paniculata* (the type, which is more erect in growth than the variety *grandiflora*), the larger Deutzias and Spiræas, Paul's Scarlet Thorn, Delphiniums, etc., and, in front of these, Phloxes, different varieties of Irises, *Aquilegia cœrulea*, *Spiræa palmata*, *Lilium umbellatum*, and the Japan lilies; with Castor-oil plants, *Eulalia Japonica*, and Cannas where some of the shrubs died out, which give it a sub-tropical effect. Still further in front are the lower kinds of herbaceous plants, and the whole are arranged without formal lines. He had a visit from the late E. R. Mudge, who admired the bed, and wanted one like it, though he had great quantities of Coleus and Achyranthes in long lines of ribbon gardening. From such a bed as the speaker had described he could cut flowers freely and have plenty left. He had some rocks lying naturally, where he cleared out the soil in front and carted

in leaf mould and planted Kalmias on the upper part of the bed, with Rhododendrons, Azaleas, and Andromedas in the lower part, and in this bed many varieties of lilies are planted, which bloom later than the shrubs mentioned. This has proved a very satisfactory arrangement, and is one which many might have.

He did not think bedding plants could ever be dispensed with in cemeteries, but their use can be very much modified, to the advantage of all. The present system of bedding has been greatly overdone, and it is to be hoped that herbaceous plants, which, when properly arranged, can be made to produce the finest effects, will speedily be brought into more general use.

E. W. Wood thought that the essayist could have given just as beautiful a picture of annuals and bedding plants as he had of hardy herbaceous plants. There are two classes of plant-growers; first, those who raise flowers for the market, and, second, the amateurs, who cultivate them for their intrinsic beauty. Fashions change in flowers as well as in dress, but every fashion brings some really beautiful things, which outlive the fashion. A few years ago everything was in lines; and the speaker mentioned a border at the late Alvin Adams' place, where there were five rows of harmonious colors in curved lines, producing a most beautiful effect. Then came solid beds, such as we have seen at Ex-President Gray's. Now the tendency is to herbaceous plants; but the pendulum swings to extremes and we forget the beautiful lines. There are many bedding plants which it will be hard to wipe out. There are some herbaceous plants and annuals that produce good effects in combination with more costly and delicate plants. Sweet peas, for instance, can be used in connection with greenhouse flowers; and we could not spare the Asters.

Mr. Beard admitted that he could do something in the direction of writing an essay in favor of bedding plants. He did not advocate wiping out bedding plants altogether. Herbaceous plants leave room for the very plants mentioned by Mr. Wood; bedding plants leave no space for anything else, and people who spend their money for them get discouraged and give up gardening altogether.

Mrs. H. L. T. Wolcott said that the speakers at these meetings usually address themselves to florists, and as long as florists find it profitable to sell bedding plants we shall have them. Women have been held up to disgrace for making crazy patchwork, but the hideous beds of glaring colors often seen in our public squares

reminded her of crazy patchwork more than anything else. She saw a garden in the county where she lives which was equally objectionable in this respect. It is a waste of time to make such beds, or any other ugly thing. She does not believe in planting flowers in straight lines. She alluded to the beautiful water-lilies exhibited here last fall by Mr. Sturtevant, and said that we ought to have them, in place of the flower beds, in the Public Garden.

Henry Ross said that he did not hear Mr. Beard's essay very well, but should want to read it and make one more patchwork bed. He wanted to go and see Mr. Beard's garden, which, his neighbors said, was wonderful. He believes in shrubs, herbaceous plants, and bulbs, and wants them all, but to give perfection you want flower beds also. The number of plants proposed is too great for small gardens. You cannot get in enough to give a succession of blooms. He has advocated partially doing away with bedding plants and having more herbaceous plants. He likes to visit picture galleries, and on entering one has stood entranced by some beautiful picture, and the same effect was produced on him when he saw the arrangement of bedding plants at Forest Hills, which required as much artistic skill as painting. At Ex-President Gray's he has gone round the grounds and looked across the lawn, with its solid beds of geraniums and background of shrubs and rocks, and the beauty of the scene has so entranced him that he wanted to look at it in perfect silence. It adds to the attractions of bedding plants that we have them only a few months in the year. Taking them away would remove one of the greatest beauties of our gardens. He wants both bedding and hardy plants, and does not believe we can get the best effect with only one; but if he could have only one in a small garden, he would have the bedding plants. Shrubs give bloom but for a short time, but with carpet bedding we can have beauty through the season.

Hon. Marshall P. Wilder was much pleased with the remarks of Mr. Ross. The pendulum may swing too far, as Mr. Wood says. What is the object of bedding plants? Is it not the ornamentation of our grounds? What else will give such a constant show of color for three months? The effect produced by bedding plants cannot be attained in any other way. But the materials must be used with taste and discretion, and the work must be well done. He had never seen anything so beautiful in carpet bedding as at Forest Hills. Mr. Beard's lecture will be a check to the extravagant and injudicious use of bedding plants; but the speaker would

be sorry to see the system which has made our parks so beautiful wholly given up.

John Robinson said that different persons look at the subject under discussion from different stand-points. One has a large estate and another a small city garden, and the latter will plant the portion nearest to the street for beauty, without reference to cutting flowers, and in the rear he will plant anything that he fancies, for cutting or any other purpose. It is possible that most of those who have spoken may be right from their respective stand-points. He does not himself like the crazy patchwork style. He had recently seen near an old mansion a mound of Sempervivums, etc., in the garden, which might as well have been artificial, and the stiff bedding plants at the sides might have been likewise as well made of tin. He did not object to a little border of bedding plants, but to make the whole garden of them is hideous.

Mr. Beard regretted that no one seemed able to take the middle ground, which he was aiming at. At such places as Mr. Hunnewell's the gardeners can combine plants so as to make a beautiful picture; but in small places this cannot be done. The owner of a small garden will get a florist to plant his lines; but you can't cut flowers from bedding Pyrethrums or Alternantheras or Coleus or Achyranthes. His remarks were intended for the owners of small grounds. He has only nine thousand square feet of land, but with the aid of cold frames he can cut flowers from January to January. Those who advocate the use of bedding plants in such places desire the unattainable. He would not come here to plead for bedding plants, but few have tried herbaceous plants. What is a bed of Coleus alongside of a bed of Carnations, that you can cut and smell? Bedding will die of its own weight in small gardens; he would not abolish it in large parks, etc., if he could.

A paper on "Old and New Roses," by Joseph H. Bourn, of Providence, R.I., Ex-President of the Rhode Island Horticultural Society, was announced for the next Saturday.

BUSINESS MEETING.

SATURDAY, January 31, 1885.

An adjourned meeting of the Society was holden at 11 o'clock, the President, JOHN B. MOORE, in the chair.

Hon. Marshall P. Wilder, Chairman of the Committee appointed at the last meeting to prepare resolutions in memory of Charles Downing, presented a report, which he introduced with the following remarks: —

Mr. President: — I hold in my hand the resolutions which have been prepared in memory of the late Charles Downing; but I ask the privilege of offering a few remarks as my tribute to his memory before presenting them. The decease of Mr. Downing is to me a most afflictive event. He and I were associated together for nearly half a century in efforts to advance the pomology of our country. Succeeding, as he did, his brother, A. J. Downing, whose eulogy it was my sad duty to pronounce thirty-two years ago, he became the author of the "Fruits and Fruit Trees of America," all the editions of which have been dedicated to my name from the first. These circumstances have drawn us more and more closely together by the ties of affection and friendly regard. I knew him well, and I can truly say I never knew a more truthful, conscientious, and upright man in all the relations of life. As a pomologist he was world renowned for his knowledge, accuracy, and good judgment, and he has had a longer experience in the study of fruits than any other man of whom I have any record, either in this or any other country. His books will ever be precious memorials of good fruits and good men, — of a life whose great object was to make others happy in the enjoyment of the beauties and bounties of creation. Charles Downing is gone, but his name will live in the hearts of grateful millions as a benefactor of mankind. Ere long I shall follow him; but I fondly trust that we shall meet again in those celestial realms where we may gather fruits from the trees of life, that perish not with the using. Oh, yes! there is another life above, where we may meet the friends we love.

The resolutions were then read as follows: —

Resolved, That the members of the Massachusetts Horticultural Society desire to express at the earliest opportunity their sorrow at the removal from earth of their late friend and Corresponding Member, Charles Downing, of Newburg, N.Y.

Resolved, That his life has been a blessing to mankind, and that his death is a loss not only to our nation but to the whole pomological world.

Resolved, That while we thus speak we would acknowledge most gratefully the Divine goodness which spared him to us so long, and that although his star has now set, it has left a golden record, which will illumine the annals of pomology while the earth shall bear fruit or the love of nature shall have a place in the soul of man.

Benjamin G. Smith was called upon, and said that in the departure of Charles Downing pomology had lost its leader. The connection of the speaker with the American Pomological Society brought him into close association with Mr. Downing, and he should always cherish and keep alive the memory of their intercourse.

Robert Manning spoke of his acquaintance with Charles Downing and A. J. Downing, many years ago. Charles Downing's acquaintance with the numerous varieties of fruits introduced to cultivation in the last half-century was doubtless more extensive than that of any other person in this country, and it is not probable that any man will, in the future, become possessed of so wide knowledge, for Mr. Downing gradually grew into it as the fruits were from time to time made known. Many of those described in the various editions of the "Fruits and Fruit Trees of America" have been rejected on account of their poor quality; and many possessing much merit have been superseded by better kinds, yet if all were still in existence it would be an unprofitable task, even were it possible, for any one now to undertake to identify and describe them.

Mr. Downing was extremely cautious and conscientious in pronouncing an opinion on the identity or quality of a fruit, and never, among all the multitude of new fruits submitted for his judgment on their quality, rated one higher than it deserved. The speaker mentioned particularly a day spent with Mr. Downing four or five years ago, when they drove around the environs of Newburg, and visited many of the beautiful gardens and grounds there, including the former residence, with the nursery and specimen grounds, of Mr. Downing. In the afternoon they visited the cemetery, a section of which was under the charge of Mr. Downing, where they saw the grave of his brother, by whose side, in the soil which he loved, cultivated, and adorned, Charles Downing's mortal remains were laid.

William C. Strong said there were two prominent American

names which had a world-wide celebrity among pomologists, one of which we cherish as with us today, and the other is now taken from us. Mr. Downing had rare fitness for the special work to which he gave his life. He was not a public man, and rarely raised his voice, even in gatherings of pomologists and horticulturists. The vast amount of knowledge accumulated by him on his special branch of horticulture could not be communicated to any one, and we cannot but ask what becomes of such stores of information? for it is not to be supposed that it perishes with the mortal life of one who has acquired it. We should feel grateful for the example and benefit of such a life, and live in confidence of meeting again.

Joseph H. Bourn spoke of meeting Mr. Downing at the sessions of the American Pomological Society, where the heart and hand of every one was opened to him. His life was spent in communing with the beauties of nature, and all will honor him as the leader in American pomology.

President Moore said that he had not the pleasure of an intimate acquaintance with Mr. Downing, but, from what he knew of him, regarded him as a particularly unselfish and conscientious man.

The resolutions were unanimously adopted.

Mr. Wilder then presented a painting which Mr. Downing had directed to be sent to him for the Society, the following letter being read: —

NEWBURG, N.Y., April 27, 1880.

MY DEAR FRIEND MR. WILDER: —

The fruit painting which I have requested to be sent to the Massachusetts Horticultural Society after my death it may be of some interest to them to know how it was obtained. After the Annual Exhibition of the Newburg Bay Horticultural Society in 1862, Mr. Charles Tice (a self-taught artist of this city) requested specimens of fruit to make a painting, which was readily granted, and after being executed it was purchased by the Society.

The following season it was offered as a prize for the best general collection of fruits, which it was my fortune to obtain.

CHARLES DOWNING.

It was Voted, That the thanks of the Society be presented to William Wait, the executor of Mr. Downing's will, for his kind-

ness and promptness in sending the painting, with the expression of the Society's appreciation of the gift, and grateful acknowledgments therefor.

The Executive Committee reported, recommending that the invitation of M. Ch. Joly to participate in the International Horticultural Exhibition at Paris be accepted, and that the President appoint a delegate thereto. The report was accepted and adopted.

The Executive Committee also recommended that an invitation from Hon. George B. Loring, United States Commissioner of Agriculture, given at the request of the National Cotton Planters' Association of America, to send delegates to a Convention of those interested in Agriculture, to be held in New Orleans on February 10, in the Grand Hall of the Exhibition, to continue one week, be accepted. It was voted that the President appoint delegates.

The Executive Committee also reported in regard to the suggestion in the President's Address, referred to them, whether this Society is not entitled to State bounty to the same amount and on the same conditions as is given to Agricultural societies; that it is expedient to send a member to the State Board of Agriculture. On motion of Edward L. Beard, the President appointed Mr. Beard, John C. Hovey, and Charles N. Brackett a committee to nominate a member. The Committee reported the name of E. W. Wood, who was thereupon elected a member of the State Board of Agriculture for three years.

The Executive Committee also reported their approval of the appropriation of a sum not exceeding twenty dollars, to supply the deficiency in the subscription for Silver Vases for prizes at the Rose Exhibition in June, 1884, this appropriation having been moved at the meeting on the 3d of January, and then referred to the Executive Committee.

Adjourned to Saturday, February 7.

MEETING FOR DISCUSSION.

Old and New Roses.

By Joseph H. Bourn, Providence, R.I.

The roses appropriate to this climate and locality for out-door culture, called *Remontant* and *Hybrid Tea*, are the most valuable, if not the most beautiful, of all the groups of Sappho's "queen of flowers." A lack of the requisite specific knowledge of the most approved and hardy varieties, united to ignorance of their practical treatment, delayed an interest which the rose admirer now manifests when he looks in pleasurable admiration at the improved forms of nature's sweet offering, indubitably excelling the rhodon and rosa thus spoken of in the remote past by the poet: —

> "Dear to earth, thy smiling bloom;
> Dear to heaven, thy rich perfume."

The Greeks adored this flower of the highest antiquity, and the Romans bestowed praises on its loveliness. Anacreon sang its primal birth; Homer extolled its gracefulness, and borrowed its brilliant colors to paint the glowing richness of the rising sun; Herodotus exulted over the sixty petalled varieties which grew spontaneously in the gardens of Midas in Macedonia; Catullus vaunted its charms; and Horace admired "the richly tinted face, whose bloom is soon fled;" Virgil contrasts the pale sallow with the blushing hues, and extols the roses of Pæstum with their "double spring." Those costly ornamental gardens, destroyed almost ten centuries ago, no longer shed the morning fragrance of rose perfume. Nettles and brambles encumber the footpath of the traveller, and, like a poetic memory of the past, the cyclamen and the violet now trail among the *débris* of the old city. Ausonius, writing at the very close of Latin literature, draws from the roseries of Pæstum a picture of "beauty doomed to premature decline," and tells of watching "the luxurious rose beds, all dewy in the young light of the rising dawn-star." Roses bore away the palm from all flowers during the sovereignty of Augustus and subsequent rulers; but Cicero did not approve of the custom, introduced by those who were given to luxurious entertainments, of taking their meals reclining on rose leaves. Verres, a Roman governor of Sicily, gave audiences wearing

wreaths of roses upon his head and around his neck, sitting upon a cushion made of the finest of Malta linen, full of sweet-scented rose-buds. Cleopatra and Nero extravagantly decorated their banqueting halls with rosy ornaments and garlands; and distinguished guests were greeted amid roseate bowers, while the merry dance went round in an atmosphere redolent with roseal odors. Every evidence exists that we must connect the rose with the lore of antiquity; for the ancients preserved its luxury, and it was the ornament of their festivals, their altars, and their tombs; while their poets made it the symbol of innocence and modesty, of grace and beauty. It is probable that the Romans had roses of similar species with some of those we now cultivate, since they practised sowing the seed, as well as propagating by cuttings, by grafting, and by budding. Hot-house growth was also understood and practised, says Seneca; and it was a boast to have carried this flower so far towards perfection as to surpass the cultivators of Alexandria, Memphis, and Rhodes. That the rose never fatigues is shown by the reputation it has maintained through all the ages. Although a hundred generations have succeeded each other, it is still a queenly belle, notwithstanding it did not escape the devastation attendant on the revolution of empires, or the more desolating invasions of the Huns and the Goths.

But while we do not ignore an historical interest in the rose, the subject of more practical inquiry is, what roses can we successfully grow in our gardens? I answer, none but such as are planted under the conditions which the laws of nature certainly require, followed by special watchfulness until the trees become well rooted and established in vigorous growth; and then intelligent study must be given to the varied habits and conditions of growth of each variety. The most popular, because the most useful, roses, are the Remontants, whose special beauty consists in the shell form of the large petals, softly recurving in their glistening freshness of color; and for decorative purposes, the varieties should be the free-flowering kinds, noted for elegance and brilliancy *en masse*, in preference to those possessed of great symmetry of form. The favorites of a generation ago — Madame Zoutman, Blanche-fleur, Chénédolé, and Paul Perras — are unsurpassed today in quality, hardiness, and fragrance combined; but the Remontants, on account of their freedom of bloom, are now regarded as the most important of the many groups of roses cultivated. The modern classes of the rose claim no less than twenty species

as their progenitors; and from the proneness of nature's offspring to assume new styles and shades arise individuals differing from their parents. To give a correct knowledge of the rose now so popular, we must become so acquainted with certain types in this group, — which gather together many varieties whose excellent qualities are the result of artificial selection,— as to learn that there are peculiarities that pertain to families which have distinct attributes by which they may be distinguished from others.

In 1842 and 1843 rosarians were delighted with the Baron Prevost and La Reine, now regarded as the oldest types and most enduring and freest bloomers, favorite examples of which are Paul Neyron, Madame Boll, Anna de Diesbach, and Madame Nachury. In 1846 was introduced the Giant of Battles, rich in color, but fleeting, of slight odor, subject to mildew, and difficult to propagate, and, on account of the poor constitution of these varieties, the Prince Camille family have taken their place.

In 1852 the General Jacqueminot appeared as a most valuable acquisition, and from its great popularity this family is now the most numerous of all. Its members are invariably of shades of red and crimson, moderately hardy, and generally highly perfumed. Leading examples are Marie Rady, Pierre Notting, and Marie Baumann.

In the same year originated the Victor Verdier, having numerous descendants, tender, and of slight fragrance, and yet a valuable collection on account of their free flowering, good illustrations of which are Mlle. Eugénie Verdier, Étienne Levet, Countess of Oxford, and Captain Christy. Of all the families it is the best for forcing.

In 1853 the Jules Margottin was a surprise, — almost odorless, and difficult to propagate from cuttings, but making very vigorous plants when budded. Some of our most popular and elegant roses, — Madame Gabriel Luizet, John Hopper, Duchesse de Vallambrosa, Madame Lacharme, Magna Charta, and Rev. J. B. M. Camm, — are of this family.

The flowers of most perfect form presented themselves in the Sénateur Vaïsse type, like Madame Victor Verdier, Mrs. Laxton, and E. Y. Teas, followed by the Charles Lefebvre, of less vigorous habit; the Prince Camille group in 1861, magnificent in their dark velvety shades; prominent members of which are Monsieur Boncenne, La Rosière, Baron de Bonstetten, and Jean Liabaud; but shy bloomers in the autumn; the Alfred Colomb, elegant in

form and color, and odorous; the Duke of Edinburgh, beautiful when grown in a moist, cool climate, but fading under our hot sun; and lastly, the Baroness Rothschild, a superb rose of extreme delicacy, with an exquisite foliage, and of great value to the florist for greenhouse culture.

There is a type recently introduced, more valuable than any I have spoken of, called "Hybrid Tea," of which La France was the original in 1869, of silvery rose color, and having the combination of the Provence and Tea perfumes.

It is now regarded as a decided advance in the art of rose culture to obtain new varieties which shall combine the hardiness of La Reine and Paul Neyron with the free-blooming qualities and fragrance of Bon Silene and Souvenir d'un Ami. In this class nature has been relied upon to accomplish what we wish by sowing the seed promiscuously, producing some flowers that are tea scented, while others show the Tea blood in the foliage. Roses of this family, which are looked upon with much interest, and which have novelty and promise of usefulness, are the Duke and Duchess of Connaught, Cheshunt Hybrid, Viscountess Falmouth, Madame Alexander Bernaix, Madame Étienne Levet, Julius Finger, William Francis Bennett, and Lady Mary Fitzwilliam.

The roses of the past have been the product of nature, unaided by human effort, while those of the present chiefly come from sowing the seeds of varieties which have not been crossed. The roses of the future may and should be produced principally as the result of artificial fecundation and hybridization. Our aim should be to control and assist nature as far as possible in her tendency toward variation; and in order to obtain new sorts of marked individuality, we should avoid crossing varieties too much alike, for

> "This is an Art
> Which does mend Nature, change it rather; but
> The Art itself is Nature."

Some physiologists are of the opinion that, in hybridizing, the offspring assumes the foliage and habits of the male, while the flowers are influenced more by the female. If this be so, the head and hands may look for any result the mind may suggest; and at least we must conclude, from the advance made within a brief period, by the introduction of new groups, that there is much which is desirable in the rose that we do not already possess, but is yet to be obtained. While the botanist collects and examines

the productions of nature, and arranges them in classes and orders, which he again divides into genera and species, pointing out their properties and uses, the florist applies the art of culture, with the view of fashioning them to his own taste. Since nature's plants are all open to improvement, the originating new and improved kinds by the product of a mixture of two different species is one of the most fascinating departments of the floricultural artist; who is moving continually amid ideal scenes, knowing what forms he wishes, but not what he will obtain.

So every year the florist has disclosed some new and progressive charm; and while he has caused an increased interest in roses generally, and a better demand for them, yet they are rarely seen in the perfection of their loveliness, from a want of judicious selection and treatment. The roses of all lands are with us, but changed in their constitution, — some weakened, others strengthened by a change of diet, climate, and care. The rosery should be both exposed and sheltered, a place of sunshine and of shade; the centre clear and open, and the protecting screen around. The requisite conditions of a spot selected for rose culture cannot always be judged by the mere texture, depth, or character of the soil, even in conjunction with climate and situation; for it is more a matter of actual experience than calculation. The rose trees should be so arranged that the sun will shine upon them from its rise to meridian, and then leave them in shadow and repose. The hardy may preferably be planted in the autumn, the tender in the spring. Set plants of one or two years' growth, and prune before planting, for the shortening of the shoots and roots reduces the number of buds which draw upon the sap, and a more vigorous growth follows. Choose a day when the earth is easily worked and friable, for planting. Place the roots three to six inches under the surface, and set deeper in light and dry than in strong and moist soils. Transplanting should occur once in five or six years, but budded and grafted varieties more frequently become impaired; the wood, annually weaker, does not attain that maturity and size necessary to the production of fine flowers. If we carefully remove a tree in this condition we shall find large, sucker-like roots, almost destitute of fibres, which have been burying themselves in the earth each succeeding year. Removed farther from the reach of nourishment, the bush dwindles and becomes debilitated, which is remedied by replanting in the autumn, cutting off the suckers and pruning the roots.

Roses may be grown to perfection in ordinary garden soil, but they must be cultivated, and the ground thoroughly drained, dug, and fertilized, and rendered as porous as possible. In clay loams the use of sand, lime, soot, burnt earth, and loose, light vegetable matter, like leaves decayed to mould, will alter the texture and improve the quality. At the time of planting strong fertilizers are not required, but when the trees have become established they like rich soil, which should be made light for the delicate rooting kinds, and more tenacious for the robust and hardy; and it would be reasonable that the classes and varieties differing in their nature should have more than one soil, that each may receive that which is the most suitable. A knowledge of the several ingredients of the earth in which our bed of roses is planted would afford desirable information, in order that we may apply at the right time the proper kind of fertilizers; and a renewal of the surface soil with old pasture loam every two or three years will supply important elements unattainable by any other method. The upper earth should be kept light and loose, in order to readily admit those constituents which cause growth, and the soil should be filled with such particles of food in the particular form necessary to unite with the air and water, avoiding the application of more fertilizers in a soluble state than the plants can consume. A critical observer and careful grower might say that the earth should be filled with stimulants in different stages of decomposition, that the tree may, in all conditions of growth, have plenty of food; to be applied often, in a weak, liquid form, when the plants are growing and especially flowering. An application of bone and potash acts favorably when the earth is removed from the bushes in the spring. A frequent sprinkling of water at evening adds health to the foliage, and is a preventive of insect destruction; and it is best to imitate nature, and wet the earth thoroughly only when dry, withholding water until again needed.

Pruning is the most important and difficult operation to perform with success, on account of the extent of the genus, made up of varieties differing so much from each other in habit and character; and as so much is dependent on circumstance, much must be left to the judgment of the operator. Autumn and spring pruning both have their helps and hindrances, for with some roses the latter is unfavorable to the development of branches and flowers. It is a good rule to prune all but the sensitive kinds in the autumn, but to leave the shortening of the shoots until spring. An improved

symmetrical form is obtained by disbudding, or rubbing out some of the eyes when swelling, which method of pruning takes the place of thinning out the weaker branches, whereby the remaining buds produce stronger wood, and consequently there is a healthier and larger surface of foliage. The important results which arise from pruning are, the maintenance of the tree in health and vigor, giving a form agreeable to the eye and advantageous to the development and display of its blossoms, and securing an abundance of fine flowers. The most desirable and pleasing form for trimming is that of a pyramid, or half oval, where all of the shoots and branches receive a due portion of air and sunlight; and we should never forget to look to the name, to know the habit and character of the variety to be pruned, to ascertain if it is a strong or weakly grower, and whether or not the finest flowers are produced indiscriminately from the low, middle, or top germs.

There is no royal road to the elegant garden of roses. Although a more generally diffused taste for the cultivation of this charming race of plants is manifest, few have a sufficient knowledge of their habits to know how to grow them intelligently. Besides, we must see these choicest gifts of nature to be acquainted with their excellences. In most of our gardens there are no special attractions to the rosarian, but a happy, peaceful home to the entomologist. Yet there are pleasing spots which receive studious attention, where nature seems to have expended all her wealth in rendering the earth blossomy beautiful with the simple loveliness of the roses; most elegant at sunrise, when newly dilated by the breath of morn, and showing all that freshness in which consist peculiar charms, too soon vanishing before the radiance of a summer's sun. In their purity and splendor these souvenirs of love and friendship blush and gleam amid their glossy leaves.

I am often asked what varieties are to be most commended for garden culture. All of the several types have some peculiar and distinct characteristic which is valuable. I should therefore elect from the different families according to the number desired, regard being had to variety of shades, hardiness, and freedom of bloom, giving preference to those whose petals are abundant, and regularly and gracefully disposed; and, usually, the thicker these are the richer the tints and the longer the flowers endure. Dark roses, as a rule, are the first to fade; but Louis Van Houtte, Marie Baumann, and Alfred Colomb rank high for permanency of color. The rose shades that are the most durable are illustrated in Marquise de

Castellane, Rev. J. B. M. Camm, Marguerite de St. Amand, and Jules Margottin; and from the pink choose Eugénie Verdier, Baroness Rothschild, and Comtesse de Serenye. Jean Liabaud, Baron de Bonstetten, John Hopper, La Rosière, Madame Gabriel Luizet, Paul Neyron, Marchioness of Exeter, Thomas Mills, Anna de Diesbach, E. Y. Teas, Maurice Bernardin, Madame Hippolyte Jamain, Charles Darwin, Abel Carrière, Madame Victor Verdier, and Monsieur Boncenne are grand garden roses; while Marie Verdier, Lady Sheffield, Duchess of Bedford, Madame Scipion Cochet, Alfred K. Williams, Duke of Teck, Pride of Waltham, Mrs. Jowitt, Harrison Weir, Merveille de Lyon, Ulrich Brünner, Earl of Beaconsfield, Helen Paul, and Countess of Roseberry are less known, but quite fine and estimable. Some of you are familiar with many of the new roses, — Antoine Mermet, Alexandre Dupont, Joseph Metral, Louise Cretien, Madame Delavaux, Souvenir de Leon Gambetta, Violette Bouyer, Centenario de Camors, Fanny Giron, Marie Lagrange, and Ernest Prime. A few of the new French Remontants of 1884, which will soon be presented for your approbation, are, from Pernet, the Baronne Nathaniel de Rothschild, a large, globular, delicate rose color; from Levet, the Madame D. Wettstein, cherry red; from Gonod, the Étendard de Lyon, a large, fine shape, purplish crimson; also the Souvenir de Labruyère, vivid rose, centre darker; from Dubreuil, the Admiral Brisbet, a fine-scented, pinkish crimson; and from Liabaud, Docteur Dor, large, tea-scented, dark cherry red, shaded darker; Madame Pitaval, light cherry red; Madame Stinouge, purplish red, and Monsieur Hoste, velvety crimson. From Guillot, the Gloire Lyonnaise, fine form, free and scented, creamy white, with yellow centre. Every season brings out novelties, but few real gems, mostly imitations of familiar acquaintance; and we must not expect to meet with the improvement of former years, but must rest satisfied with the more gradual development usual among plants that have been long in cultivation.

With all the beauty which the rose possesses, we cannot speak of perfection in any one variety, and the fine qualities that are manifest in one season are not likely to be obtained in another; while hindrances to good culture are constantly presenting themselves to the most experienced and best informed. Some varieties will flower only in June; others are handsome but not fragrant, like Charles Lefebvre and Étienne Levet; the petals of some fade as soon as exposed to a shower, or a strong mid-day sun, like

Madame Nachury, and Gloire de Bourg-la-Reine; others do not open well, like Pierre Notting, Empress of India, and La France. Some are slow growers, others have delicate stems. A few are subject to mildew, which spreads and affects others, and should not have a place in the garden, like the Countess of Oxford, Sir Garnet Wolseley, and Caroline de Sansal. Nearly every best rose that is grown has some defects, and many are somewhat tender, like Marquise de Castellane, Baroness Rothschild, and Eugénie Verdier. The best and most certain means for preservation of rose trees that have a delicate habit is to give plenty of air and sunshine, the influence of which agents hardens the texture of the wood and renders it impenetrable to insects. The largest intelligence, united with constant vigilance, will reward us annually with only a few flowers which have the requisite qualities of richness and permanency of colors combined with fulness and gracefulness of form, and sweet odor.

Autumn flowers, I am inclined to believe, are improved when grown on trees raised from cuttings rather than from the bud or graft; for those that are worked are in an artificial condition, and less able to contend throughout the season with adverse influences than such as carry their sap in continuous currents. The luxuriantly growing wood should be allowed to bear moderately until the time for the late blooms. François Michelon, Fisher Holmes, Monsieur Noman, Marguerite de St. Amand, Victor Verdier, Boieldieu, Annie Wood, and Alfred Colomb are esteemed for large, handsome, late flowers.

When blooming in native wildness and simplicity the rose is universally admired by the botanist, while it has many attractions to the casual observer; and the wild roses of our woods and hedges, though of a simple type, are the impersonations of elegance and beauty. They adorn the solitude where they grow; and glancing, half concealed, from their green bowers must have reminded the Pilgrim, in the wilderness, of home. In connection with the delightful study of botany, our lovers of scientific explorations and of beauty in the field could add attractive graces to our highways and by-ways by adopting the customs of the Hungarians, among whom the finest kinds of roses are found blooming in unfrequented places, produced by budding the wild varieties, which the ladies of rank and fashion do in their rambles.

We cannot but decide that the Remontants are of a most heterogeneous character, and that the varieties are so different in

their nature as to require varied culture and treatment. Our remarks have had special reference to out-door growth; but there are some of this class that do not expand their flowers freely in the open air, though beautiful when forced; while others, of rare excellence in the garden, are of little worth for the greenhouse. The Baroness Rothschild, Édouard Morren, Mabel Morrison, Hippolyte Jamain, Madame Gabriel Luizet, Duke of Edinburgh, Magna Charta, Thomas Mills, Anna de Diesbach, Mrs. Harry Turner, and Anna Alexieff, have a healthy habit for forcing, are of pure colors, and of full, symmetrical form. Early spring flowers of these and other free-growing varieties are obtained by cutting well-ripened wood from out-door trees late in the autumn, and grafting upon the Manetti and other stocks, which have plenty of fibres to gather food for their support in December. The cultivation of this class by artificial means has been yearly increasing to meet the demand for these sweet reminders of our summer time. They are called by florists, in the winter, fancy roses, and produce sparingly flowers of surpassing elegance, which command large prices, on account of the demand for them and the extra care requisite to produce good specimens. Attention is now being given to these beautiful but costly dainties of nature in your vicinity, and distinguished success has been obtained by your honored President, and others, producing better flowers than are grown from like varieties in the open air.

The arrangement of roses cut from the tree is a matter of taste in regard to which there does not exist a unanimity of sentiment, else we should be wearied with a continued sameness. But there are certain fixed laws that regulate the decorative art in flowers. Too many blooms are used for single baskets and bouquets, where they are crowded together promiscuously, exhibiting a mass of petals, the form and coloring of each separate flower being indistinct, with little of its own foliage to render the proper effect. The more nearly roses are shown as they naturally grow the better effect they produce. The stiff, artificial stem, without the leaf of the flower, propped up by smilax, ferns, and other green than its own, is not like nature. Hand bouquets of roses and buds are more beautiful when made of the same variety with its own foliage, stems long and loosely bunched, having a small number, well chosen, of sweet odor. A collection in basket form, or for parlor decoration, had better lack a flower than have one too many, the object being to form a graceful, refreshing, and suggestive picture, preserving an "easy negligence mixed with art." Show each

bloom separately, reposing in its own green, and remember that a few colors have a prettier effect than many. If a combination is thought to be desirable, red, white, and buff are pleasing. The beauty of roses is much impaired when they are displayed in masses. As a rule, if there are to be many flowers, use the delicate shades; if few, the deeper tones; and we should not forget that large and choice roses are always most effective when displayed in standards proper for their reception as single specimens.

Born in the East, the rose has been diffused, like the sunlight, over all the world. Syria, according to some writers, took its name from Suri, a species of rose indigenous to that country. From the Celtic word "rhudd," signifying red, we trace a resemblance in the names by which various nations distinguish this plant, — Rhodon, Rosa, Rosier, Rosajo, Rosal, Rosiera, Rosenstock. Classical writers, from Homer to Horace, extol the rose above all other flowers; and those who loved beauty most have been its greatest admirers. The rose is "the honor and beauty of flowers," says Anacreon; and it is spoken of at the Persian feast as

> "The floweret of a hundred leaves,
> Expanding while the dew-fall flows,
> And every leaf its balm receives."

In the beginning of the ninth century Charlemagne manifested an appreciation of this particular flower, and later the hanging gardens in Hispania, under the Moorish dominion, were richly and heavily decorated in brilliant bud and bloom of roses. How elegantly Cowper describes the expanding rose, filled with the raindrops of the passing shower, as "weeping for the buds it had left with regret;" and Cowley sings of a rose, surpassing those we have on earth, that the angels scattered from gilded baskets: —

> "Some did the way with full-grown roses spread,
> Their smell divine, and color strangely red;
> Not such as our dull gardens proudly wear,
> Whom weathers taint and winds' rude kisses tear."

The Empress Josephine was passionately devoted to the rose, and sought for every novelty which the nations of Europe possessed, in order to gratify her pleasures in the garden at Malmaison; and it is said of her, that in all her greatness, a single rose in her hair surpassed the jewelled diadem. In almost the last

letter Mr. Longfellow penned, he spoke of arranging some wonderful Newport flowers in his library under the lamps, "— fancying myself back in the days of the *troubadours* playing at the floral games of Toulouse."

Memory bears us up the stream of time, when we are to believe the roses in the famous gardens of the East were as pure and steadfast as now, relics of Eden's bowers, "sweet nurslings of the vernal skies, bathed in soft airs." The same resistless beauty was doubtless manifest, flaunting in the shades of early morn; the same sunshine loved them then, because they were so fair; the same closing and fading of the petals were descried under the dropping of the dews in the gloaming. The ages certainly have not detracted from the loveliness of beauty's queen, nor has constant association made the rose less alluring. The admirer of the rose in summer time in this favored locality can sit before his favorite flower in mute admiration, and find refreshment, rest, and peace in the parterre, as he surveys with delight his collection, whose brightness and sweetness bring tender memories, solaces, and hopes, while the reflections awakened by floricultural nomenclature afford new sources of enjoyment. He seems for a brief period to dream of other climes, in the companionship of distinguished friends and acquaintances, all attired in richest apparel. The counts and countesses, dukes and duchesses, princes and barons, lords and marquises, queens and empresses, sultans and presidents, cardinals and doctors, generals and captains, senators and reverends, ladies and knights, madames and mademoiselles are a royal family, grand and graceful when expanded to fullest beauty "of flowers purple, red, and white, like sapphire, pearl, and rich embroidery," amidst rosebuds blushing through their bowers of green, more lovely still the more concealed.

> "There a noble crew
> Of lords and ladies stood on every side,
> Which, with their presence fair, the place much beautified."

And so we talk, when the earth is clad in snow-white robes, "of the sweet season that bud and bloom forth brings." Now our thoughts again revert to the delights of spring and summer, full of sunny days and roses. They carry us also to the primitive home of our cherished flower, where the objects of admiration are never exhausted; where the Syrian and Musk rose, replete with

dewy wine, cover the sacred ground. No frost there visits the grass. Emblems of life continually exist, and roses glow in gem-like tints, hanging in cataracts from the gray walls of the fortified villages, topped by a crown of foliage. Amid such scenes the traveller exclaims in wonder, "Who can paint like nature!" as he views this shadowy curtain of gorgeous colors on mouldering stone-work when the sun goes down behind the amethyst-tinted hills.

> "Soon we shall see the swelling buds,
> As one by one their tender leaves unfold;
> As if they knew that warmer suns were near,
> Nor longer sought to hide from winter's cold."

Transitory, almost ephemeral, is a rose's brief life of joy; but its sweetest gift is preserved in soft perfume as we drink the breath of the crushed, roral leaves, after they have fallen and withered.

> "She did not care to see their glorious hues,
> Fearing the richer perfume she might lose."

> "Yet, though thou fade,
> From thy dead leaves let fragrance rise,
> And teach that virtue lives when beauty dies."

> "And yet may sweet things with us stay;
> As in the garden roses blow
> In white and red, — just as they lay
> In white and red so long ago."

Discussion.

Edward L. Beard said, that the greatest obstacle to rose culture is that people do not understand the method of keeping the bushes free from insects. This is the greatest necessity in rose culture, and nothing but eternal vigilance will effect it. People complain that their bushes are eaten up, and want some easy method of keeping them clean; but there is no royal road to this result. Roses require pruning, and sometimes get soil-sick, and the soil must be renewed; but keeping them clean is a more important point than either of these; it is the great necessity to make rose culture popular. Insecticides must be constantly applied, and

the best is soapsuds; all that is made in the house should be saved, to give the rose bushes a bath two or three times a week. The next best insecticide is water from the hose. Tobacco water and hellebore powder are excellent, but whale-oil soap, unless carefully applied, is destructive of the foliage as well as the insects. Rose-bugs must be picked off by hand. There is a beetle which cuts the foliage at night, and drops to the ground, but, unlike some insects, there is only one crop of them. The speaker picked a quart one night, and the next about half as many; the third night only a few; the fourth night none were to be found, and there were very few the next year.

William C. Strong said that Mr. Bourn's paper contained a great deal of eloquence and a great deal of practical information. His experience was that pruning roses in the fall is injurious: the winter often kills a great deal of wood; and we can see better in the spring whether any pruning is necessary beyond removing the dead wood. His experience also is that roses grafted on the Manetti stock, even the strongest growers, — General Jacqueminot, for instance, — give the best results. He would add to the list of desirable roses the *Rosa rugosa*, which, though the flowers are single, has admirable foliage, and is surpassingly beautiful as a shrub.

John C. Hovey agreed with Mr. Beard in regard to insects. He asked why so little is said of the white Cottage rose, which he had seen in old gardens, and thought very desirable. All the plants that he had ever seen were old. He had been unsuccessful in raising it from cuttings or seed.

Benjamin G. Smith said that among his earliest recollections was that of the Cottage rose. He has a plant which he got twenty-eight years ago. He regards it as a most satisfactory variety.

Rev. A. B. Muzzey had listened with much interest to the historical account of the rose, given by the essayist, from which it appears that it has been a favorite in all ages. Undoubtedly it is the favorite flower of a majority now. In his father's garden were two large, white rose bushes, from the flowers of which rose-water was made; but much less of this is made now than formerly. Roses were grown in the house more successfully in former years than in modern times; in his early days he knew a lady who cultivated them with great success, but, although she continues the same methods, she fails. The speaker asked what is the cause of this change — is it the atmosphere, or the food, or the illuminating

gas, or is it due to the varieties? It is extremely desirable to ascertain the cause of failure, for nothing is so delightful in the parlor or study as blooming roses.

John C. Hovey had known a number of cases similar to that mentioned by the preceding speaker, where, before gas was introduced, roses did well. He thought the cause of failure was something put into the soil or taken out of it.

Hon. Marshall P. Wilder thought the paper which had been read a remarkable one, historically and scientifically, and also for its beauty and eloquence. He did not know how he could controvert anything that the essayist had said. He was surprised at the close study which the writer had made of the various classes of roses. When the paper is examined it will be found that he has given us just the information we want. Mr. Wilder concluded by moving a vote of thanks for this remarkable paper, which was unanimously passed.

President Moore said, in answer to Mr. Muzzey's inquiry, that the use of coal stoves, air-tight stoves, furnaces, and gas had made it more difficult to grow roses and other plants in the house than formerly, but they can be grown in an old-fashioned kitchen with a large chimney and a wood fire, as well as ever. The Cottage rose is difficult to propagate by cuttings, but easy by layers. It is very beautiful for a fortnight in June.

Mr. Strong did not agree with the President in regard to furnaces; he thought them one of the best protections against impure air. A well-constructed furnace, with a wrought-iron dome of sufficient size, an ample evaporating pan, and introducing plenty of fresh air, will give us the best atmosphere we can have in-doors in cold weather. Plants in the house must be kept free from dust, and will want showering and care to keep away the red spider, — the worst of all insects.

Mr. Hovey said he did not refer to gas from a furnace, but to illuminating gas.

Joseph H. Woodford said that in his experience it was impossible to grow roses in parlors; they can be grown in the kitchen, where the air is cooler and moister and changed oftener. In outdoor culture they must have very rich soil. In the fall he banks them up with earth six or eight inches high, and fills the space between the rows with good strong manure. In the spring the ground is levelled, and the portion of the plants covered will be found to be unhurt by the winter. All Remontants are tender and should be

protected. He would never prune roses in the fall under any consideration. The greatest trouble is from insects. He had succeeded in keeping his roses clean by applying hellebore with a dredging-box early in the morning. Three applications should be made, — the first before the buds form, which kills the first insects that come; the second before they bloom; and the third after blooming, — which will be sufficient.

The Chairman of the Committee on Discussion announced that the subject for the next Saturday would be, "Methods of Fruit Growing;" to be opened with a paper by Professor S. T. Maynard, of the Massachusetts Agricultural College.

BUSINESS MEETING.

SATURDAY, February 7, 1885.

An adjourned meeting of the Society was holden at 11 o'clock, President MOORE in the chair.

The Annual Report of the Treasurer was read by the Secretary, accepted, and referred to the Committee on Publication.

ARTHUR W. BLAKE, of Brookline, and
DAVID NEVINS, of Framingham,

having been recommended by the Executive Committee as members of the Society, were on ballot duly elected.

Adjourned to Saturday, February 14.

MEETING FOR DISCUSSION.

The President having retired, the chair was taken by Vice-President BENJAMIN G. SMITH. The following essay was read by the author: —

METHODS OF FRUIT CULTURE AND FORESTRY.

By Professor S. T. MAYNARD, Amherst.

In travelling through many sections of Massachusetts, and in fact of all the New England States, one of the most striking

features that meet our view, outside of the villages, is the vast amount of waste or unproductive land. On every hand we see rough, stony hill-sides, almost barren plains, brush-covered pastures, and swamps that produce little but brush and coarse weeds. In many sections much of the land is becoming dotted over with forest trees, and showing unmistakable signs of total neglect.

In looking over the census of Massachusetts, for 1875, I find that at that time there were in this State alone 1,469,988 acres of unimproved land, exclusive of that so covered with trees as to be classed as woodland. This land is devoted principally to pasture; but the income derived from this source must be very small, for I find that five acres, on the average, are required to support each farm animal pastured for six months, including sheep and calves. The average value of such land is given as $27 per acre, and probably ranges from $5 to $50. The question then naturally arises, What can we do to improve this land, and how can we get a larger income from it? Since the use of chemical fertilizers has become general, much of the smooth land that can be cultivated has been taken up and made to produce paying crops.

Throwing out the 469,988 acres as being free from stones, so as to be easily cultivated, which, I think, is a fair estimate, we have left 1,000,000 acres, that, in its present condition, cannot be profitably cultivated. It is generally conceded among farmers that pasture land cannot be profitably improved by the application of special fertilizers and seed without cultivation, or at least very few follow in that line of improvement, so that we must look for other means for an increased income. Two ways present themselves by which such land can be made more profitable: First, by planting forest trees; and, second, by planting with fruit trees.

When I began this paper I had in mind the title, "Methods of Forest Planting and Fruit Growing in Turf," and you will pardon me, I know, if I touch upon the matter of forest tree planting in turf before I consider the methods of fruit culture adapted to such land.

Probably all of the gentlemen present can recall instances where the native White Pine, the Austrian and Scotch Pines, the Norway Spruce, the Larch, the Elm, Maple, Ash, and other trees have been planted in turf, and have made a satisfactory, and in some cases a remarkable, growth. One or two examples will suffice to

illustrate this point. Upon a poor, gravelly hill-side, on the college farm at Amherst, where nothing but brambles and white birches would grow, were planted, ten years ago, a lot of European Larch and Scotch Pine trees, about two and a half feet high. The trees were taken from a nursery about half a mile distant, one squad of students digging them, while another squad was planting. The holes were dug about fifteen inches deep and eighteen inches in diameter, and after planting the trees the soil on the upper side of the hole was moved to the lower side, to form a basin to catch the water as it runs down the slope. Nothing was applied in the way of additional fertilizing material, but the surface soil was used first about the roots, and the subsoil spread upon the top. With the exception of about a dozen trees, all lived, and after about two years began to grow rapidly. This lot last fall furnished a flagstaff for the barn at the Experimental Station, from one of the larches, thirty feet long, seven inches in diameter at the base, and two and a half inches at the top. Many of the Larch trees are larger than this, and the lot will average about thirty-eight feet high, and six inches at the base. The Scotch Pines, planted at the same time, upon the same land, have not reached as great height, but are of greater diameter, and have made more branches. Had a mulch been used after planting, or a little bone or some other special fertilizer been added, the growth would have been much more rapid the first two years; and they would now be larger, as is shown by a few specimen trees from the same lot that were planted on equally poor soil, but which were mulched, and have had a few shovelfuls of compost put around them at different times. One of these larches now measures eleven inches in diameter at the base, and forty feet high, and there might be cut from it three lengths for posts: one large stick eight feet long, that could be sawn so as to make two posts five and a half inches thick at the base and three and a half inches at the top, one round post seven inches thick at the base, and five inches at the top, and one good vineyard post; the whole worth at least fifty cents per tree. Reckoning the average value at one-half the above, and estimating 1,000 trees to the acre, we have a value of $250 per acre.

In 1871 a lot of white pine seedlings were taken from an old pasture and planted along a hedgerow where an old Virginia fence had been removed. The ground was full of roots of all sorts of brush, which made the digging of the holes very laborious. Three rows were planted, about five feet apart each way, the trees

when planted being about three feet high. None of them died, and now their average height is about thirty-three feet, and the diameter at the base about nine inches.

Of deciduous trees we may see in almost every village examples of rapid and healthy growth in turf land. Where the growth has been unusually rapid may also be found evidence of a great abundance of plant food; but perhaps no greater amount than is often found in pasture land that produces such luxuriant crops of brush as many of them do. I would not advise the attempt to grow any crop on a soil that has not in it, naturally or otherwise, an abundance of plant food, but I feel certain that land which will produce large crops of brush naturally, may be made, with a little outlay, to produce a satisfactory growth of either forest or fruit trees.

In planting such land it is essential to success to select that which is suited to the growth of the kind of trees desired. Before planting I would line out the land, by stretching a wire or cord across the lot and setting stakes, to secure uniform intervals between the trees. Then, if there is much brush, I would remove it along the line of the row. If time and help are limited I would cut only a path two or three feet wide, and remove the rest when other work was less pressing than during the spring. One of the best ways to get rid of the brush is, in the fall after the ground is frozen, or in open winters, when there is no snow upon the ground, to take a broad-bladed bog-hoe, grind it sharp, and hoe off the brush close to the surface of the ground. All the smaller brush like that of huckleberry, blueberry, sheep laurel, etc., may be easily cut close to the ground, and many of them will fail to start again; while the grass and other herbaceous plants will work in rapidly and assist greatly in choking out brush which starts later into growth. The brush should be raked up in piles between the spaces for trees, and the holes dug in these cleared paths. It may look like a great task to dig holes in much of our rough, stony land, but as it is of little consequence whether the trees are exactly in lines or not, the variation of a few inches will almost always enable us to dig holes at sufficiently near the proper distance, and very few spaces will have to be passed by. A man with proper tools — a stout sharp spade, a bar, and a bog-hoe with a pick on one end — will dig from two hundred to five hundred per day. In a piece of newly cleared woodland, where the rocks were as thick as they will average in our pasture lands, and the ground was full of roots of the heavy growth of wood re-

moved, I employed a man last spring who could dig two hundred and fifty holes for apple and peach trees in a day. This was rather more than I wanted to do myself, but I did succeed in keeping up with him for about two days. From this experience I am satisfied that in much of our old pasture land an ordinary laborer would dig more than that number per day. After the trees have been planted, the brush and other coarse material should be drawn close up under them, and if the soil is very poor it would probably be found a good investment to use from a quarter to half a ton of fine ground bone to the acre at the time of planting.

The second method of utilizing the above-described lands is by planting them with fruit trees. Of all the various branches of agriculture or horticulture in New England, fruit culture, I believe, offers the greatest inducements for the future. Nowhere in the world can fruit of such quality and beauty be grown as our apples, pears, plums, peaches, and cherries, and the improved transportation facilities, and methods of preservation, have very largely increased the market for it.

The history of the cultivation of all fruits shows us that "the more *good* fruit the people have, the more they want;" and there is almost a certainty that good fruit in the future will bring paying prices.

For several years past I have taken the position, that, with the use of chemical fertilizers, and the brush, grass, and other coarse material growing upon much of our stony land that *cannot* be cultivated, such land can be made to produce paying crops of fruit; while the land that *can* be cultivated, should be used for other purposes. I am still almost alone in this position; yet I can see some marks of progress, and am more and more convinced that a system can be worked out by which entirely satisfactory results may be obtained.

After an extended examination of the apple trees of many sections of the State I find, as a rule, that the oldest, most healthy, and productive trees are generally growing in turf, and that in a great many old pastures seedling trees are springing up, and growing with great vigor. There seems to be little difference in the vigor and hardiness of trees growing in turf, whether they started from seed where they are now growing, or were transplanted, the condition of the soil being the same.

In orchards that have been cultivated for a few years and then seeded down for a time, and this process kept up, the trees soon

become weakened and liable to disease, and often die long before they are fully grown.

The vigor with which a newly transplanted tree starts into growth — other things being equal — depends upon the amount of moisture and plant food in the soil, in condition for the roots to take it up as needed. Trees do not start into growth as quickly when planted in turf as when in tilled ground, for two reasons: first, the moisture is rapidly carried off by the numerous leaves of the grasses and other plants; and, secondly, the plant food is absorbed by other active roots as fast as it is prepared.

In cultivated land the moisture is kept from escaping by constant stirring of the soil, and, there being no other feeding roots in the soil, the trees get an abundant supply of plant food as it forms.

The question, then, to be answered, in the turf system of planting, is, *can we supply the proper conditions of moisture and plant food?* If we can is there any reason why our hill-sides may not become covered with productive orchards and profitable forest plantations?

By the addition of a few handfuls of fine ground bone, or bone and potash, to the soil used in filling around the roots of the trees at planting, and by the use of mulching material, both of the above conditions may be easily and cheaply obtained, and trees thus planted will make as rapid growth as in cultivated land, and be much more hardy, and live to a greater age.

If there is not enough mulching material on the land it may often be easily obtained from an adjoining lot, or such substances as machine shavings, sawdust, spent tan, wool waste, bristles, straw, leaves, and other like materials may be used. It will be urged by some that the effect of the mulch will be to cause the roots to run so near the surface as to be injured by the extremes of our climate. This might be the case upon land that is cultivated, but here it is only needed until the trees have become well established, and is spread only a few feet around the tree. If the land is given up to the growth of trees only, the decaying grass and leaves that fall down annually will keep up the fertility of the soil until they begin to bear, when, if annual crops of fruit are to be expected, additional plant food in some form must be used. Should the brush growing upon the land after a few years not be needed for mulching, it may be piled up while green, and in a few more years will become a mass of vegetable mould, that will make the best kind of top-dressing for fruit trees or other crops.

As we know little of the methods of planting those orchards now found succeeding in turf land, I will give the details of a plan based upon the experience of planting a twenty-acre lot recently cleared of heavy wood, and a part of an old pasture now in process of preparation for spring planting.

In planting fruit trees we must select land suitable to the growth of the fruit we intend to produce. The apple succeeds best upon a deep, moist, sandy loam; the pear, plum, and quince upon soil heavier than is required for the apple, and the peach and cherry upon lighter and higher land. The process of clearing and planting is as follows: With a reel containing No. 14 galvanized wire, with drops of solder at intervals of fifteen feet, to mark the places for stakes, the land is laid out by first staking off two opposite sides, at proper distances; then from side to side stretch the wire taut enough to raise it above obstacles like large stones, stout brush, etc. At intervals of thirty feet put a large stake for an apple tree, and midway of each space put a smaller stake for a pear, plum, peach, or cherry tree. Then fifteen feet from this set a row of all small stakes for trees of one kind, of lesser growth than apples, and then fifteen feet from this line stake out a line like the first. In this way we have the spaces marked out for apple trees thirty feet apart, and the others intermediate. The distance for the apple trees will be considered by many to be too small; but if, instead of pruning the trees by cutting out only the inner branches as is commonly done, so as to form a straggling head, the end branches are occasionally headed in, there are but few varieties that will need more than that space. After having the land staked out, if there is much brush — and the more small brush the better — it may be cleared off as suggested for forest-tree planting. If the winter offers no time for cutting the brush, as described, it may be mown off with a common brush scythe in August. Cut at this time, many young, tender shoots are thrown out, and, growing late, are often entirely destroyed by the cold. The process of digging the holes has already been described, and should begin as soon as the frost is out of the ground, or it may often be done the fall previous to planting.

It is generally advised not to use any fertilizing material, except the surface soil, in planting fruit or ornamental trees, but I have never seen injury result from the use of well-decomposed manure, ground bone, or bone and potash, in moderate quantities, mixed thoroughly with the soil. Before planting, one to five handfuls of

ground bone, or one to three of bone and potash, may be thrown so that a portion shall fall into the hole and the remainder upon the pile of soil used for filling in about the roots. After planting, the mulching material is to be drawn about the trees, covering a space of from three to four feet in diameter.

Trees planted in the manner described will make a vigorous growth at once, and will be more hardy and live longer than those planted in cultivated land; while the cost of land and its preparation for planting will be far less than if the land were smooth and cultivated.

Until the trees are large enough to bear the land should be devoted wholly to their growth, and after they begin to produce fruit more plant food must be applied in some form, and animals must be turned in, to assist in the destruction of injurious insects that develop in and feed upon the fruit. For the destruction of the codling-moth, apple-maggot, and curculio, sheep, swine, cattle, and horses may be turned in; and if the plum is grown, poultry also must be employed to preserve the fruit from the attacks of the last-named insect.

As to the results of the above-described method of fruit growing a few examples must suffice. I find the following account of an old orchard in the "Torrington (Conn.) Register:"—"Probably the largest orchard in this town is on the Levi Hodges farm. Col. Hodges set out about a thousand apple trees, and about eight hundred of them are now large, healthy trees. Most of the orchard is on a steep hill-side, and if the apples drop they keep on rolling until they reach the bottom. The ground is very rocky and good for little else, but the exposure is a warm one, with favorable conditions for the growth of the apple. Sheep are allowed to run in the orchard, which the owner considers an element of its success. It is an off or odd year orchard, except one portion, which has worked around to bearing the even year. The crops for the past sixteen years are as follows: In 1871, the yield was 1,200 bushels; 1873, 2,500 bushels; 1875, 2,000 bushels; 1877, 600 bushels; 1879, 600 bushels; 1881, 900 bushels; 1882, 800 bushels; and the present season, 1,000 bushels."

Of the newly planted orchards I will give an example or two, as an illustration of the use of fertilizers to give the trees a start.

Last spring Hon. James J. H. Gregory, of Marblehead, the well-known seedsman, planted one hundred apple trees in turf on

the borders of an old pasture, and he now reports them all alive and as having made a good growth.

Upon a piece of very stony land that had many years ago been ploughed, but which was fast covering over with pitch pine trees and blackberry vines, were planted last spring one hundred and seventy-five small No. 2 peach trees, averaging not much over a quarter of an inch in diameter at the base. The holes dug for the trees were not over fifteen inches in diameter. At planting, a single large handful of bone and potash was thrown across the hole and upon the pile of soil. After the roots were covered with about two inches of soil another handful was scattered in, and the remainder of the soil filled in. After planting was over, about the first of June, two more small handfuls of the same fertilizer were sown upon the surface around each tree, and a line of turf about one spade wide was turned over, so that the land was cultivated for about three feet around the tree. The total cost of trees, fertilizer, and labor was just six cents per tree. Only five or six trees died, and the remainder have made an entirely satisfactory growth.

There being no mulching material near at hand, none was used; but, as the early part of the season was rather moist, they did not suffer from drought. The mulch will be applied next summer, and it is expected that in a few years there will be as fine an orchard of trees on that lot as can be found on any cultivated field of equal fertility.

Discussion.

Hon. James J. H. Gregory said that it had struck him as very reasonable that waste land could be utilized for fruit growing. The idea of Professor Maynard was a novel one, and the speaker inclined to the belief that the practical result would be of great pecuniary value to our State. A few years ago it was a question what farmers here should do with their apples; but since then the great business of evaporation has grown up. The exportation of apples has also grown to an immense business, and we can almost claim that it belongs to us by our position in the best apple producing belt; which runs through central New England. Outside of this belt there is no competition in growing apples for market, and the speaker believed that the exportation and evaporation of this fruit are destined to increase immensely. The Western apples are larger than ours, but consumers complain that when evaporated

they are insipid and have not the spirit and high flavor desired in cooking-apples, and which ours possess. It behooves us to make the most of these facts, and now, to aid in doing so, comes in the plan of utilizing waste lands. Apples from strong, rocky pasture lands are superior in quality to those grown on rich, moist soils. It is rare now to see a young orchard: farmers were discouraged, by the glutted condition of the market a few years ago, from planting them, and have neglected those previously planted; but it is time now to begin again. People do not like to give their best land to orchards, but, if they can be brought to see that waste lands may yield apples, they will plant. The speaker has acted on Professor Maynard's plan. He has planted Baldwin trees in pasture land on portions inaccessible to the plough.

O. B. Hadwen said that Professor Maynard had introduced a feature of fruit growing which most of us had not thought of. There is a very large area of land in this State, such as rocky land where rich soil has accumulated in the hollows, that is better fitted for apple growing than for anything else. Apples are not the most profitable crop on the best land, but if they can be grown on comparatively waste land when properly enriched, it will be a gain, for a barrel of apples is better than an empty barrel. The speaker was favorably impressed by Professor Maynard's idea of pruning apple trees so as to keep them well in hand. There is a doubt whether the cultivation of apples can keep pace with the foreign demand, and if anything can be done to supply it from our waste lands it should be done.

William C. Strong was not surprised at the hesitancy shown in speaking on the subject, as the view presented was new to most of those present. Most of the land of the members of the Society is smooth and rich, and they had not anticipated that waste lands were to come into competition with their long-subdued and tilled lands. The speaker had great respect for the opinions of Professor Maynard and Mr. Hadwen, and admitted that what they had said has force. Professor Maynard indicated that such places as he described are especially suited to the apple, which is similar in its nature to forest trees; and possibly standard pears may be included. But the idea of cutting away brush and digging little holes to plant fruit trees sounds strange to us, yet when it comes from a gentleman of such good sense it must have weight. Still the speaker felt that the first-prize fruit would continue to come from cultivated orchards, though it might not always be of the finest quality for the table; and

growing prize fruit is a very different matter from the profitable growing of fruit for sale, which he believed could be done on rocky land. For minor fruits, such as the peach, etc., culture is essential. He was glad to hear the essayist and others speak so confidently in regard to raising fruit on waste lands. People speak of the low price of apples, but we should think of the prodigality of nature and the low price at which they can be produced. We should aim to produce fruit at the least expense.

E. W. Wood said that small fruits would hardly be included by the essayist in his plan of culture. A feeling of depression in regard to the culture of apples existed a few years ago, due largely to low prices and canker-worms. He did not think we ought now to anticipate a glut of apples; the market is practically unlimited. He was not yet prepared to believe, however, that apples can be grown in brush land. They can be planted there, but will not give good fruit without fertilizing. Farmers need not, however, take their most valuable lands for orchards. There is no question that a hill-side, and rocky at that, is best for apple trees, provided the soil is strong enough. He would not plant pear trees between apple trees; the pear is longer lived than the apple. Peaches can be grown between apple trees without any difficulty, as they are pretty sure to die out before the apple trees get large. He knew a peach orchard of three acres at Grafton, where the best crop sold for thirty-five hundred dollars, and that of the next year for about two-thirds as much. Last year the buds were all killed, and this year it is the same; but if we can get an occasional crop it is the best paying of all fruits. It is true that they need less fertilizing than other fruits. The speaker did not believe in apple trees flourishing in an old, compact soil; if one does it must be in a spot peculiarly favored otherwise.

For evaporated apples, large fruit, free from knots, is wanted. Mr. Wood doubted whether we could compete with the West in this part of the business, but in shipping we have the advantage of more highly flavored fruit, and of being nearer to the point of shipment. A barrel of apples costs as much to transport as a barrel of flour. In some localities apple trees have been eaten by canker-worms every year for thirty years so that the trees looked as if they had been burnt over. Where they prevail to such an extent they are a great nuisance; but there are persons who will guarantee to keep an orchard clear for ten cents per tree. They do it by spraying with Paris green.

Asa Clement spoke of reading in a newspaper advice to plant fruit trees in waste land; but in his vicinity such lands are of very poor quality. Professor Maynard does not mean such land as this, but strong soil that holds moisture pretty well. Thirty years ago the speaker planted apple trees in newly cleared pasture land, where in some places there was so little soil among the rocks that he had to cart it in, to get enough to set the trees in. These trees have done well. The cattle run among them until September, when they are excluded in order to save the windfall fruit. He thought well of the suggestions of the essayist. Apples can be grown without much cultivation, but if planted in waste land it must be the right kind; the light soils must be left for pines and larches. He has some trees fifteen years planted that look well; those thirty years old look as if they wanted something to help them along. He strews a little ashes and bone around his trees, which improves the pasture. If they had regular supplies of food they would go right along. Some of his trees are in heavy land, where the springs are too near the surface in some places. He advised to plant apple trees where a growth of oak or hickory or other hard wood had been cut off. He has a few Roxbury Russet trees, which are not satisfactory; the Baldwin succeeds better. He thinks that apples from young trees keep best, and that a medium-sized apple keeps better than an overgrown one. There is no difference in quality between apples from cultivated and uncultivated land. He has successfully set apple trees so large that it took three men to carry one.

Mr. Hadwen said it was well understood by every one who grows apples that they must be fed with proper fertilizers, and neither Professor Maynard nor any one else can do it without. The question is whether it is any more expensive to give nourishment to trees in grass than in ploughed ground. Professor Maynard recommends not to cut the grass around the trees, but to leave it on the ground, as crops removed from the ground exhaust it.

The speaker has an orchard planted in 1843, and ploughed and fertilized since then. The trees have grown very large, but if not pruned the fruit is not so large as in grass. Fruit ripens earlier in tilled land than in grass; the ploughed ground absorbs more heat. Some kinds, among which are the Northern Spy and Holden, will be a month later in grass than in ploughed land. Trees in grass, enriched annually, give the best fruit so far as regards quality. Prize fruit must be grown with the best cultivation, and

then somebody must pick out the specimens. There is a good opportunity for those who have suitable pasture land to try what can be done by planting it with apple trees. A tree in cultivated land may be as much neglected as it can be in pasture land.

Mr. Wood said that Mr. Hadwen was right in saying that no one can grow apple trees without feeding them. The speaker repeated his previous statement that apples and peaches can be grown with less manure than other fruits, but not in hard, compact sward, which intercepts everything that you want for the trees. Trees must have more care than is commonly given them; farmers have not been encouraged to give their trees the care they need. There is no profit in apples the off year; but the speaker believes that in fifteen or twenty years the apple will be one of the most profitable crops.

Mr. Gregory thought that acid apples would sell best, when evaporated. The Western fruit looks well, but the sharp apples will take the palm. Professor Maynard made the point that trees should be manured when set out. Apple trees will begin to bear in twelve years from planting, and the whole expense up to that time could not be more than $100 per acre. Mr. Gregory believed it would pay to grow them as food for cattle and hogs. He has sixty acres of pasture land with wild apple trees almost thick enough for an orchard, and has had men at work for weeks grafting them. Land where such trees will grow will give good apples. He is always careful to graft so high that a cow cannot reach the grafts with her horns to break them. He has often seen four feet of growth on the grafts in such trees.

Edmund Hersey said that it was his fortune or misfortune to be always trying experiments in agriculture, and he sometimes thinks that the more we experiment the less we know. He has felt a great interest in fruit growing, but is not satisfied with the results he has thus far attained. There are so many conditions to be considered that it is difficult to grasp them all. He gave an account of two orchards which he planted to ascertain whether it is best to keep apple trees in cultivation or to mulch them, as nature does. The land in which he tried this experiment consisted of half an acre of gravelly knoll, running down to richer land; another portion was a little richer. All the trees had the same care in planting; the land to be mulched was not ploughed. The result was that at first the ploughed orchard grew rapidly; the other made shoots of only a foot or a foot and a half in length.

When the cultivated orchard was ready to bear, many of the trees which had grown most rapidly were injured by bursting of the bark, and some were wholly killed; but he saved a majority of the trees. To check this excessive rapidity of growth the orchard was laid down to grass. The other orchard was heavily covered with coopers' shavings — hardwood and pine — eight or ten inches in depth, and made a pretty good growth right along. Porter trees in it give four or five barrels of apples every other year. Trees on the brow of a hill where the gravel shows, and the soil is so poor that grass will not grow there, made a good growth and gave some very good apples. He afterwards discontinued mulching; but the orchard still gives good apples. He did not wish to be understood as saying that the superiority of this orchard was due to its not being cultivated, and to the other being cultivated. The condition of the atmosphere is one point to be considered. He means to mulch again. He can use a great variety of material for mulching; red cedar boughs are one of the best materials. He would not use hay or grass, because it burns through, and he thinks trees need something cooling. His own experience taught him that two feet of common gravel over the roots of trees would start them up wonderfully; and he knew a case fifty years ago, where several apple trees, then apparently past their prime, had four feet of gravel filled around them, which renewed their vigor, and they have continued to bear good crops until now. It is good to cover the ground five or six inches deep with peat muck. He gave the results of his experiments only, — the facts but not recommendations, — and would not undertake to say what is the best way to raise trees.

Samuel Hartwell said that he has an orchard in good fruit soil, and takes a good deal of pride in the trees; and another in grass land, where the trees are not worth as much as when they were planted He knows a man in Marlborough, who had exceedingly fine apples, when they were generally poor, from land in pasture for twenty years, but he thought there were few such situations as that. He would not advocate planting apple trees in small patches in pastures, for they would be apt to be neglected. It might do to lay orchards down to grass once in fifteen or twenty years. In his best orchard he has peach trees planted between the apple trees, three peach trees to one apple tree. The peach crop is destroyed three years out of four, but it pays when he gets one.

Benjamin G. Smith expressed the opinion that apple culture in its present development is not an exact science.

Professor Maynard said that they have at the Agricultural College a peach orchard planted seventeen years ago, where many of the trees have given every indication of the yellows; yet a large part of the diseased trees are now in perfect health. The treatment was to furnish abundance of plant food, especially muriate of potash. He thinks this, in connection with good feeding, a specific remedy for the yellows. Muriate of potash tends to retard the ripening of the wood, while phosphoric acid hastens it, and hence it may be well to use ground bone in connection with the muriate of potash. He thought that by this treatment peach trees might be carried to twenty-five years of age and kept healthy.

The Committee on Discussion announced that on the next Saturday Mrs. T. L. Nelson would read a paper on "Garden Flowers."

BUSINESS MEETING.

SATURDAY, February 14, 1885.

An adjourned meeting of the Society was holden at 11 o'clock, Vice-President BENJAMIN G. SMITH in the chair.

No business being brought before the meeting, it adjourned to Saturday, February 21.

MEETING FOR DISCUSSION.

GARDEN FLOWERS.

By Mrs. T. L. NELSON, Worcester.

With the awakening of spring come the first flowers, pale and delicate, alike in native and cultivated species. Under the snow they have been waiting, and they seem to shrink from the light. As the season advances brighter colors appear. Crocuses, Scillas, Hyacinths, Crown-imperials, Tulips, Narcissuses, and many other flowering bulbs make our gardens gay. These were all planted out in the autumn, and need not enter into this discussion. Nevertheless they are an important feature in the garden, which

must necessarily be almost without flowers through the spring months unless we have spring bulbs. None that I have mentioned need be renewed or transplanted every year, except Hyacinths, which are best the first year, and gradually deteriorate. In the spring it is more pertinent to take up the subject of summer flowers, and for this reason I shall confine myself to flowers that come after spring bulbs have done blooming. Among the many flowers worthy of cultivation it is difficult to select a few of which to speak. I hope you will not think because I speak of particular kinds that I consider them the most worthy of cultivation; I mention them because I have grown them, and they are familiar to me. There was a time, and not very long ago, when we could have taken up the subject of familiar garden flowers and disposed of it in half the time we can now. Times have changed, and flowers have multiplied in number and species, until it would take half a dozen papers like this to exhaust the subject, or even to treat it fairly. Not only have we more known species, but each is divided into almost countless varieties, so that it is simply impossible to speak of more than a small portion of our cultivated flowers in the short time allotted to this subject today; therefore I will talk of some flowers that grow in my garden.

Roses have been so ably and exhaustively treated and discussed by this Society that little remains to say of them. For every variety of years ago there are hundreds now. In the old time people never thought of improving the rose. Why should they? Had not the rose been sung and praised from time immemorial? And were not the same roses good enough for them? I suppose it did not enter into the minds of our forefathers that there could be any improvement. The Damask was the rose among roses. The Centifolia, or Cabbage, as it is commonly called, the old White rose, and some other sorts were grown in all old gardens. Well do I remember the rose bushes in our home garden, laden with their wealth of fragrant blossoms, and the low red roses, which were my *beau-ideal* in childhood. These old roses are like voices of the past to aged people. Except as souvenirs, they have been superseded by an entirely new class.

Take the Lily. From a very few varieties, what an outgrowth there is! We have them from many countries. There are seedlings, hybrids, and sports. As with all flowers, collectors are on the lookout for new sorts every year. The lilies to which "Solomon in all his glory" was not to be compared were probably

Amaryllis lutea, a small yellow lily which blooms abundantly in Palestine. What would have been said if the lilies in question had been *auratum!*

The Gladiolus, not many years ago, was confined to a very small number of varieties, but now their name is legion. Not only is there increase in quantity but also improvement in quality. The flower must not only be distinct but superior, or the growers discard it.

Careful hybridization has brought and is bringing about a great many changes. In no flower is there greater change than in the Dahlia, the seed of which was introduced into Spain from Mexico in the latter part of the seventeenth century. The seed produced three distinct varieties, one semi-double and the other two single. These seedlings were called Dahlias, after a Swedish botanist named Dahl. They were distributed throughout Europe, and were the only varieties grown for some years. After a time some one experimented with seed, and finally succeeded in producing double flowers, when the single were discarded as worthless. Later it was introduced into this country, and was considered *the* flower. Then it went out of fashion, for there is fashion in flowers as well as in everything else. Within a few years the Dahlia has again come into notice. We have it in a great variety of colors, double and single, large and small. I like the single sorts best for cut flowers. Either single or double flower abundantly the first year from seed, provided the seed is sown early in the spring, and the plants are put out as soon as possible — that is, as soon as there is no danger of frosts. After the first year there is no difficulty in propagating by tubers.

Helianthus multiflorus flore pleno, the Perennial Sunflower, is not as extensively cultivated as it should be. I find quite old people know it better than younger ones, for it had been lost to cultivation until some one found it, probably in some old garden. I cannot see how any one could let it go who once had it in his garden. It is herbaceous and perfectly hardy, commencing to bloom in midsummer and blooming until severe frosts. It is a beautiful plant, growing from four to six feet in height, and producing abundantly perfectly double pure yellow flowers, about three and a half inches in diameter. Altogether it is the most showy flower for cutting and for garden decoration that I know of.

There are many hardy plants and shrubs worthy of cultivation which require no special care, and there is a growing tendency

toward hardy flowers, especially herbaceous and bulbous sorts. What is more beautiful in late summer and autumn than *Anemone Japonica?* The white variety, Honorine Jobert, is the finest. Often it grows four feet in height. Large bunches of dark green leaves are surmounted by numerous pure white, single flowers, resembling those of *Helleborus niger* (Christmas Rose). It is herbaceous and hardy, only requiring a little compost in the fall. One very acceptable feature of this plant is the fact of its thriving in partial shade, and as almost everybody has some such place which is rather hard to fill, it just supplies the want.

Early in summer we have *Pœonia tenuifolia*, with its delicately cut foliage and double flowers, the color and size of a Jacqueminot rose. This is also an herbaceous plant.

The new, hardy *Amaryllis Hallii* is very beautiful. It makes its foliage early in spring, and after maturing it dies down. Late in the summer the flower stalks spring up almost like magic, so rapid is their growth, and produce a number of pink blossoms which are unlike any other Amaryllis or Lily with which I am acquainted. I consider it a great acquisition to the list of hardy bulbs.

Euphorbia corollata is an exceedingly valuable plant. The flowers are white, quite small, in panicles, and keep a long time after being cut, making it very useful for cut flowers. It is an herbaceous plant.

The Oriental Poppy is a very showy flower, and deserves a place in the garden. It is a perennial, but is easily grown from seed, and blooms the second year. Most people like it because it makes so much show when in bloom, and after that it requires no care. It is also very hardy.

The hardy Pentstemons are useful flowers, and are well worth cultivating. They are very easily grown, and I should miss mine very much.

The Hollyhock is a great favorite. People who have grown hollyhocks in old times remember them as purely single flowers, or at most semi-double, and they look on the hollyhock of today as entirely disconnected with the old-fashioned flower of long ago. Their plants were hardy and came up year after year; ours must be protected, or the place where they were will be vacant in the spring. They must be taken up, and covered in a cold frame, or protected in such a manner as not to feel the effects of freezing and thawing. It is a good plan when you have one or two rows

to put some compost and leaves around the plants, and cover with sashes and matting, or something of the kind; or, what is easier, to plant against a fence, and a stake will keep the sashes in place without the trouble of making frames. They are grown extensively from seed. The seedlings require no protection the first year beyond a little compost around the roots. Each year brings a more varied range of color. From white to black we have almost every color and shade.

The Clematis is considered hardy; but many complain that a blight has fallen on some of their plants. In many cases they flourish in the same location for years. I have a number of varieties which get no special care beyond a little mulching in the autumn. They have been out a number of years, always come up strong in the spring, and flower profusely through the season. I think *Clematis Flammula* one of the finest climbers we have. It seems more like a jasmine than a clematis. Indeed when I first saw it, it was in a private garden, and they called it *C. jasminoides*, and under that name I tried more than two years to get it. The foliage is small and bright, unlike that of any other clematis that I know. The flowers are pure white, very delicate, covering the whole plant, and very like the jasmine in fragrance. *C. Viticella* I find very hardy; and the variety *alba* has survived two winters. *Jackmanni* and some other old varieties, as I have before said, I have no difficulty in growing; but some newer sorts which I have tried the last two or three years have come up, and suddenly withered and died. Perhaps, as some dealers say, there is a disease among them. They say they dare not recommend them as they used to do. All I can say is that they disappear, and from no apparent cause.

There is a great range in bedding plants; some are desirable for cut flowers, some only valuable for garden decoration, and some answer both purposes. Among the last named are the semi-double Geraniums, and they are so beautiful and useful we might discard the single in their favor, and gain by it.

Gladioli we must have, and any one who will may grow them. With the descriptive catalogues sent out by reliable dealers one can hardly go astray in selecting varieties, but as a rule it would be better to choose from exhibition flowers, by which one can judge better than by descriptions. A great many new varieties do not satisfy our expectations, and there are so many comparatively new ones which are really fine and reasonably cheap, that it does not

pay to invest much by way of experiment. On the other hand, some fine varieties never are cheap, because they propagate slowly, either by increase of bulbs or by bulblets. I have some that I have had several years, with little increase, and I can see by them why the price keeps about the same on some bulbs, while others just as good are comparatively cheap. An example of the latter is Eugene Scribe, which increases rapidly and never produces a poor spike. I wish there were more varieties as good, yet it is cheap and accessible to all. The seedlings originated in this country are, in my opinion, as fine in proportion to the number grown as those raised in France and England. I had some unbloomed seedlings last season from C. L. Allen & Co., of Garden City, N.Y., among which I found some spikes of rare merit. A few which they had set aside for name were superb. Also, by the courtesy of Mr. Allen, I bloomed their seedling Gen. Sheridan, a very fine scarlet, not yet on the market. I have also had seedlings from V. H. Hallock, Son, & Thorpe, which were very fine. James Vick has furnished us with some excellent varieties. I think Longfellow very fine indeed. There is no need of mentioning the fine seedlings produced by the members of this Society, as they have spoken for themselves when on exhibition. With the seedlings that are being produced in this country there will soon be no need to send abroad, if, indeed, there is now. I have purchased bulbs from home and abroad, and I find I cannot get as satisfactory results the first year from imported bulbs as from home-grown. After the first year there is little difference. I never make up my mind as to the merits of an imported gladiolus the first year it blooms. Gladioli grow in almost any soil, unless it is wet and heavy, under which conditions they will not thrive or produce fine flowers. A sunny location, with light, loamy soil, partly sand, and well enriched, with plenty of water in dry times, suits them well. The bulbs must not be planted too near the surface; from three to four inches in depth, according to the size of the bulb, is about right. Remember, the new bulb or corm is made above the old bulb.

Tuberous Rooted Begonias ought to be grown in every garden. I prize them more highly than any other bedding plant, for with me they are truly bedders. They stand the rain much better than any other bedding plant that I have ever grown, from the fact that the blossoms have thick, waxy petals, and as they close when it rains, the water slips off the outside of the flower. As soon as the

rain is over the blossoms open as bright as if there had been no rain, and seem to look with surprise on their bedraggled neighbors. Last summer I bedded out about fifty varieties, amongst them *Pearcei*, which I had never seen outside the greenhouse. I never saw such fine plants of that variety. They were literally covered with the lovely blossoms, which stood well above the handsome foliage. I cannot see why this class of begonias is not more generally grown for bedding purposes, except that they are rather new. I protected mine with newspapers and cloth until the last week in October. Then I lifted them in boxes and let them ripen off. The tubers may be kept in sand during the winter, being examined once in a while to see that they do not get so dry as to wither, or so wet from any cause as to decay. In the spring they may be planted quite close together in a box of earth, where they will start without any heat. As I said before, they will stand a great deal of cold. We all remember the hard frost the latter part of last May. I trembled for my begonias, which had been planted out only a few days before. I had protected them with flower-pots from the sun in the hottest part of the day and from any change that might occur at night. Over these I put some carpeting, and they were not affected in the least by the extreme cold. I speak of my experience thus minutely to show how valuable I consider them for bedding. Another important fact is that they commence to bloom when quite small, and flower without intermission through the season.

I cannot stop to enumerate the annuals, biennials, and greenhouse plants, that help make up our gardens, nor shall I touch on shrubs, as they form a subject by themselves.

It seems as though some new plague in the way of disease, worm, or bug made its appearance every year. The last two years have been no exception. I thought last year that I had every worm or insect injurious to plant-life, known or unknown, in my garden. 1883 brought the aphis on lilies, which in many instances destroyed them entirely. Last season I determined to experiment with tobacco water. I have several beds of lilies, comprising perhaps twenty-five varieties. One bed I mulched about three inches thick with tobacco stems that had been steeped to syringe rose bushes. I threw them wet about the stalks and let them remain through the season. Although the plants were perfectly covered with the pests the previous season none came last year. The others were as bad as they could be, and I doubt

very much whether some of them will come up next spring. I brushed and syringed with cold water and tobacco water, but all to no purpose.

It is time to think of sowing seed. Annuals must be sown soon, in order to have them bloom early, for the space between seedtime and harvest is short, and we must be up and doing. Biennials if sown early will, many of them, bloom the first year, and those that do not will, by being started early, make stronger plants and be better able to withstand the winter. Truly the spring is a busy time to all growers of flowers. Dame Nature has been storing her forces, and spring flowers are only awaiting her orders to appear. The snowdrop and crocus will soon be here, and the thought of the dainty blossoms fills us with gladness and delight. Birds will not tarry long, for despite the weather they come, bringing comfort to hearts weary with waiting for winter to be over. No matter how hard the storms are after they come, winter cannot stay long, for the couriers of spring have arrived. Let us remember, as we admire the beauties of the floral kingdom, —

"God might have bade the earth bring forth
Enough for great and small,
The oak tree and the cedar tree,
Without a flower at all.
We might have had enough, enough,
For every want of ours,
For luxury, medicine, and toil,
And yet have had no flowers.

"Then wherefore, wherefore, were they made,
All dyed with rainbow light,
All fashioned with supremest grace,
Upspringing day and night: —
Springing in valleys green and low,
And on the mountains high,
And in the silent wilderness
Where no man passeth by?

"Our outward life requires them not:
Then wherefore have they birth?
To minister delight to man;
To beautify the earth;
To comfort man; — to whisper hope,
Whene'er his faith is dim;
For whoso careth for the flowers
Will care much more for him!"

Discussion.

Rev. A. B. Muzzey expressed the pleasure he felt in hearing an essay from a lady, and especially so good a paper, giving not only the result of experience in the culture of flowers but evidence of a love of nature. Ladies are peculiarly successful in cultivating flowers, and their experience is very valuable.

Mrs. Nelson said, in answer to an inquiry whether tuberous rooted begonias would stand the sun, that they will bear it better than fuchsias, but not as well as geraniums. Hers get the morning sun and a part of the mid-day sun. It is better to shade them in the afternoon.

Edward L. Beard agreed with Mr. Muzzey in his tribute to the lady members of the Society. He looked to them not only for papers at these discussions but for coöperation in all the work of the Society. He had been struck in years past with their enthusiasm and earnestness, and hoped, in coming time, for accessions to their numbers.

The extremes of our climate are such that many beautiful flowers which are grown out-doors in England cannot be grown here, but with intelligent management we can grow many that we do not now. Besides many hardy Pentstemons, natives of our own country, there are forty or fifty varieties of florists' hybrids, which, though only half-hardy, are among the most beautiful flowers in the garden. They can be grown without difficulty if lifted, and wintered in a cold frame. They are easily propagated by cuttings or by division, and he has lost very few. The Double Geum, which is one of the most beautiful perennials, but not hardy here, should have the same shelter. Mr. Beard thought he had had as much experience as any one with tuberous rooted begonias. There is no more beautiful flower for bedding, but there is a great difference in the hardiness of the varieties. The double kinds will not stand the hot summer sun. He has raised two or three hundred double seedlings. The single kinds vary in hardiness, but there are some that will stand the sun; among them are Vesuvius and Emperor. In the greenhouse tuberous rooted begonias are subject to rust, and require a great deal of air. He put them in a cold frame facing south, and most of them burned up. He concluded that it was impossible to grow them in open beds without partial shade; evergreen boughs stuck around and among them will answer this purpose. It is difficult to keep the tubers over

winter, on account of their liability to rot in midwinter; he had lost a quarter part of his. The best place to keep them is on a comparatively dry shelf in the cellar, at a temperature of about fifty-five degrees. They may be propagated by cuttings, and so perpetuated. The new varieties seem tender, like the new roses. Seedlings raised here from imported seed are hardier than the named varieties imported. They are easily raised from seed, which should be sown about the first of January, so as to be ready for planting out early in the season for summer decoration.

Mr. Beard said he should like to see the Narcissus more cultivated; there are many new and beautiful kinds. Every one should grow them. They will not do in damp soil, but want a place where the bulbs will mature in July. Another most desirable plant is the Carnation, — not the tree Carnation, but a hardier race, which, though not quite hardy, is susceptible of cold frame culture. There are from fifty to seventy-five kinds which are never seen in gardens here. Three years ago he imported thirty or forty varieties, of which he lost but few, and he has propagated from them, and in spring will plant them out; but those who plant them out and let them alone will be disappointed. They might be protected by putting a cold frame over them without lifting, but in this case the bed should be raised one or two feet. Among the best varieties are W. P. Milner, Mary Morris, Mrs. Simkins, Blush Clove, and The Governor. Cold, stagnant moisture in the ground is deleterious to them; and it is the same with *Lilium auratum* and other tender lilies, which should be planted in raised beds.

Every one who loves a garden should have a cold frame. They are ordinarily dug out about two feet in depth, and lined with plank or brick, and in winter should be banked up with leaves, and the glass should be covered with mats and shutters.

E. W. Wood was much pleased with the practical value of Mrs. Nelson's essay. Flowers will grow for those who love them, and the exhibition tables both here and at Worcester bear witness to the skill of the writer in the cultivation of flowers. He had hoped that this would prove a field-day for the ladies, who have more information in regard to the subject before the Society than most of the male members. It would be for the health of ladies to work in gardens more than they now do, and it would afford them quite as much opportunity as their dresses and room papers to cultivate their taste for colors and arrangement. The speaker referred to the methods of originating and introducing new varieties of flowers,

and said that, instead of accepting the glowing descriptions in florists' catalogues, it would be better to go to horticultural exhibitions, where one can see every week the productions of the best gardeners, with the names attached, which can be noted and selections made.

Mr. Beard said, in answer to an inquiry whether flowers can be bloomed in a cold frame in winter, that there are few that can, but there are many that will bloom in early spring. His theory of the cold frame is that it is a place for the storage of plants, to grow for winter blooming. He grows in them a succession of plants which give him greater pleasure than those in the greenhouse, including the Polyanthus, English Primrose, and Auricula, of different colors. The Polyanthus needs a cool, dry place, and must be raised from seed every year. From the end of January until summer sets in they are a mass of bloom. Pansies will bloom in a cold frame from January to June; after that they are out of place. He sows the seed in August and uncovers the frame at all seasons when it is not too cold. The *Anemone coronaria*, a very beautiful flower, may also be cultivated in the same way. He raises it from seed very successfully; he sows the seed in January and gets plants large enough to set by autumn. He has also had great success with imported tubers. He lifts these after flowering, and stores them in sand and replants in the fall. In England and the south of France it grows wild. Hepaticas also — not the hardy native species, but the double pink and double scarlet varieties — may be grown in the same way, as may also *Myosotis dissitiflora* and other varieties of Forget-me-nots. Violets do better in a cold frame than in a greenhouse, where they feel the effect of constant forcing. In cold frames they can be propagated from year to year. Mr. Robert Pratt's were the finest the speaker had ever seen; they are grown under natural conditions, in frames only, and never forced. The *Narcissus Bulbocodium*, or Hoop Petticoat Narcissus, and the white variety are very desirable for cultivation in cold frames. The Calochortus or Mariposa Lily is a most beautiful flower, of which there are fifteen or twenty species indigenous to the western coast of North America; it is said by many that it cannot be grown here, but it can be with the aid of a cold frame. They can be grown outdoors in England. There is now a great rage in England over the different species of Helleborus; within the last three or four years we have gained more knowledge of them than we ever had before. Here and in England they need the protection of cold frames, but

in Ireland they are quite hardy. The speaker has some plants of *Helleborus angustifolia*, from which he has cut flowers considerably larger than the white *Anemone Japonica*. Few could appreciate them without seeing them. The Hellebores flower about Christmas, and are known as Christmas Roses. There are many inferior varieties, of dingy colors, and not worth growing; that named is the best. Frame culture requires the maximum of light, but is not very difficult, attention to airing at all times, except on days when zero weather prevails, being most important.

Mr. Wood said that cold frames and hot-beds are two very distinct things. Only pansies and violets are grown by florists in cold frames. He believed that better bedding plants could be grown in hot-beds than in greenhouses; cuttings might be struck, and the whole stock grown in them. They may be used to great advantage, when nearly exhausted, in hardening off plants to prepare them for summer. He practises this method, and the plants grow stout and stocky.

Mr. Beard said that Mr. Wood had struck a very important point. A greenhouse-grown plant is apt to flag when planted outdoors, but a hot-bed, with a slight bottom heat, gives just what is wanted to inure it gradually to the out-door air. He would plunge tuberous rooted begonias in a nearly spent hot-bed and gradually harden them off, and other plants the same, giving abundance of air, and finally lifting the glass entirely before transplanting. This is a secret that all have not learned.

Joseph H. Woodford said that one of our best florists places portable cold frames over his Lilies-of-the-valley, and gets flowers two weeks earlier than the speaker can, though his plants are in a light, sandy soil, in full sunshine. The frames are placed over the plants about the first of March, and the frost soon comes out, and the plants begin to grow. The plants are in beds about six feet wide. The lilies-of-the-valley are the worst treated of all flowers, being put into corners and under the shade of trees, when they should have full sunshine and light, warm, rich soil. It is a great mistake to let them grow too thickly, as is generally done. They should have alternate rows, a foot wide, cut out, so as to renew the bed, and the dug spaces should be manured. The surplus plants can be given to the neighbors. They increase like strawberries, only that the runners are under ground.

On motion, it was voted that the thanks of the Society be presented to Mrs. Nelson for her interesting address.

The Committee on Discussions announced that on the next Saturday, Hon. James J. H. Gregory would read a paper on "Potash; Where Found in Nature; its Uses in Agriculture, and the Cheapest Sources of Supply."

BUSINESS MEETING.

SATURDAY, February 21, 1885.

An adjourned meeting of the Society was holden at 11 o'clock, President MOORE in the chair.

Charles H. B. Breck, Chairman of the Committee appointed on the 3d of January to prepare a memorial of Francis Lyman Winship, reported the following: —

Whereas, It has pleased Almighty God to remove from a sphere of usefulness F. Lyman Winship, a member of the Massachusetts Horticultural Society for more than thirty years, who during that time served faithfully for ten years as Recording Secretary of the Society, and for five years as Chairman of the Committee of Arrangements, and whose influence added largely to the advancing of the interests of the Society, and the promotion of a spirit of good-will and friendship among its members, —

Resolved, That we who were associated with him sincerely mourn his loss, and the loss sustained by the Massachusetts Horticultural Society.

Resolved, That we deeply sympathize with the family of the deceased in their great bereavement, and implore for them consolation from Him who has taken a beloved husband and father.

Resolved, That these resolutions be placed on the records of this Society, and that a copy be transmitted to the family of the deceased.

CHAS. H. B. BRECK,
W. J. UNDERWOOD, } *Committee.*
JOHN C. HOVEY,

Mr. Breck, in presenting the resolutions, said that he could hardly find language to express his grief at the loss of a life-long friend, who was honorable in all his transactions; who gave perfect satisfaction as Chairman of the Committee of Arrangements and as Recording Secretary of the Society; and whose genial and social nature not only made him many personal friends, but led them to feel an interest in the Society.

William C. Strong said that by the death of Mr. Winship an old landmark was removed from the Society. He was a genial companion and an active and honored member of the Society, and succeeded the speaker as Recording Secretary. He was the last representative of the famous Winship nursery, having succeeded the brothers who founded it and were largely instrumental in the dissemination of fruit and ornamental trees and plants.

President Moore agreed with all that had been said by the two speakers who had preceded him. He had noticed that Mr. Winship always had a kind word for every one.

The resolutions were then unanimously adopted.

Adjourned to Saturday, February 28.

MEETING FOR DISCUSSION.

Potash in Agriculture.

At this meeting a paper was expected from Hon. James J. H. Gregory, of Marblehead, on "Potash, Where Found in Nature, its Uses in Agriculture, and the Cheapest Sources of Supply." Mr. Gregory was prevented, by an accident to a railroad train, from being present, and a call was made on the President for his views on the subject.

President Moore said that all that is needed to be supplied to plants as food is nitrogen, phosphates, and potash, in some form. Sometimes, if the first two are supplied, the crops will fail for want of potash. The soils in this State are generally deficient in potash, but feldspar soils have plenty of it. There is not much feldspar in this vicinity, but there is a good deal in some places in New Hampshire. In such places the application of potash produces little effect. Some crops, such as asparagus, cabbages, and

potatoes, require a great deal of potash. Dr. Goessmann's analysis of the ashes of the roots and tops of asparagus showed more than fifty per cent of potash. This convinced the speaker that on many soils it is not supplied in sufficient quantity to asparagus, and now he has a bed of an acre and a half on a poor soil that naturally produced a growth of pitch pine and birch, and never had a shovelful of dung. It was dressed with potash and bone, and from it were cut the bunches which received the first prize last year. This treatment will be continued until signs of failure are perceived. The cabbage family and all fruits require potash, if it is not in the soil already; but if there is plenty already it is of no use to apply more, though some cultivators, who have increased their crops by applying it, have made the great mistake of thinking to secure a further increase by applying more when there was already enough in the soil. A gentleman in Dighton applied a large quantity of wood ashes to his ground, which added nothing to his crop; but he had previously dressed it liberally with muriate of potash. Market gardeners near large cities find stable manure the cheapest source of all plant food, and they use it very freely, and find little benefit from the use of ashes or potash; for where thirty cords of stable manure are used to the acre, as is sometimes done by market gardeners, it furnishes all the potash needed. Neither bone nor potash evaporate, and they leach but little.

Major Henry Emery said that he considered potash the most essential food for all vegetables, especially potatoes; one hundred bushels of which, with the tops, furnish by analysis one hundred and seventy-nine pounds of potash and fifty-one pounds of phosphoric acid. In boiling a bushel of washed and peeled potatoes it was found that they lost thirty-two per cent of their potash and twenty per cent of their phosphoric acid, and the water in which they were boiled killed grass when poured on it. In rich lands, or when manured with dung, potatoes are often scabby, but in land newly burnt over, or when manured with potash, they never are. He strews it along his rows of potatoes, and seldom sees a puncture of the skin. Potatoes need more potash than any other crop, but corn will not kernel out at the tips of the ears if there is not sufficient potash in the soil. Potash is excellent for grass, and, whenever applied to it, brings in clover, which contains a large quantity of nitrogen. Its action in this respect has never been explained. The speaker thought that potash or any other fertilizer would leach out of a sandy, gritty soil, unless some green crop, such as

clover or buckwheat, was ploughed in, which would retain not only the potash, but the nitrogen and phosphates. He had used seventeen tons of commercial fertilizers in a year to advantage, and prefers potash in the form of muriate. When he uses stable manure he sprinkles potash over it.

William H. Hunt said that in common with most farmers away from cities he had found a deficiency of manure. He had bought a good deal of stable manure, which cost him eight dollars per cord at his farm in Concord, and at this price he considered it an expensive manure. Some years ago he began buying phosphates and other commercial fertilizers, but concluded that they paid only with exceptional crops. He then began with the elements, bone and ashes, buying a large quantity of the former at his farm, and using freely on grapes and strawberries, and was much pleased with the results. Since then he has bought from three to ten tons of bones yearly, and ashes when he could get them. He found that it did not pay to use acid to reduce bones; unlike potash, it is not valuable as a fertilizer, and the same money expended for potash would produce better results. Last year he used eighteen hundred or two thousand pounds of potash, which cost four and a half cents per pound. It comes in casks of about four hundred pounds each, and is as hard as stone. He used four or five parts of bone to one of potash. The bone, which is ground, but not very fine, is spread in the barn cellar. The potash is broken with a sledge-hammer, and dissolved to saturation in a large kettle of boiling water. It is then turned on the bone, and sets up a great heat, evolving nitrogen, to absorb which plaster is used. Kieserite (sulphate of magnesia) is a better absorbent, but costs more. It is also itself a good fertilizer for grapes. The mixture of bone and potash is allowed to stand two or three weeks, and is turned over several times, and each time covered and mixed with plaster or loam. It is considerable trouble to reduce bones in this way, but it gives a better return for the money than buying fertilizers in the market. After the heap has fermented, large pieces of bone can be crushed in the fingers. He uses no other fertilizer than this on his strawberries, and it is equally good on grapes. He has put no animal manure on his grapes since they were set out, but dressed either with ashes or bone and potash in some form, and this treatment has been so satisfactory that he will continue it. A neighbor has used a similar preparation of bone and potash on his pear trees, making the fruit better and fairer. The speaker did not

know that he had done the best thing, but he could recommend the preparation for almost any crop. He had used it in connection with hen manure on corn and other crops with excellent results. He had sometimes been cheated in buying wood ashes. In handling the potash care must be taken not to get it on the clothes or person. Muriate of potash will have no effect in reducing bones.

William C. Strong said all are agreed that potash and phosphates are useful fertilizers, but we want to know the best form. He inquired of the President whether he had used bone-black or fine ground bone undissolved.

President Moore said that he used bone-black pretty largely one year, and had also used bone in all other forms. In choosing he is governed largely by the price, and watches to see where he can get it cheapest. He can afford to apply it pretty freely, as it does not waste, but will come into use at some time. If steamed and ground fine it will last three or four years. Potash does not waste in a sandy soil, but combines with it. The best form of potash is wood ashes, if they can be got cheap and pure, such as Canada ashes with five or six pounds of potash to the bushel; but it is not easy to get them pure. Wood ashes contain phosphates as well as potash, and this is why ashes are preferable to muriate of potash, and why leached ashes are sometimes nearly as good as unleached. He reduces bone by spreading three or four bushels of ashes, and then wetting the bone and putting it on the pile, using three pounds of ashes to one of bone. It will heat and give off ammonia, and will need turning over and covering with loam, peat, or plaster. It should have a pretty thick covering, in giving which you extend the fertilizer; but this you can afford to do when you can't afford to buy it extended. In Mr. Hunt's plan the potash is more caustic, and there is more danger of wasting the ammonia. Many people are deceived in buying muriate of potash, a high grade of which contains eighty-three per cent of muriate of potash, which is equal to fifty-five per cent of pure potash.

Bone-black is bone burnt as you would burn coffee, and is used by sugar refiners for filtering sugar; after it has been used it is burnt over to get rid of the impurities, and the fine part is screened out and sold as bone-black. It is bought by manufacturers of fertilizers to dry off their mixtures, being in the form of a fine, dry powder well adapted for that purpose. There is more phosphate in bone-black than in any other bone, but the ammonia is all burnt out of it. There is less ammonia in steamed bone than in fresh,

but still a considerable quantity, — so much that it will heat in a cask.

A. W. Cheever had composted fine steamed bone with ashes as described by previous speakers. It evolved a great heat and a disagreeable smell, and he covered it with loam. He applied it to pasture land, and the grass was improved, but whether profitably or not he could not say. A dealer in chemical fertilizers told him that, if potash alone is wanted, muriate or sulphate is cheapest.

Major Emery was still of the opinion, though the President differed from him, that a very fine, sandy soil will not retain potash, but if vegetable matter is ploughed in, the soil will hold the potash. Some soils will hold whatever is put into them. He had reduced bones by placing them in a pit and putting potash over them, and covering with two feet of loam. In this way he got his bone pure. The mixture was applied to cabbages with good results. In steamed bones three per cent of the nitrogen is lost. It is true that the ashes of asparagus have a large proportion of potash, but, like all plants that grow quickly, asparagus makes very little ashes. Poplar wood ashes have a larger percentage of potash than oak wood ashes, but the slowly growing oak makes more ashes than the quickly growing poplar.

W. H. Hills said that he had tried the experiment of dissolving whole bones and succeeded, though a chemist said he could not do it. He first tried sulphuric acid, and burnt his fingers and his pocket. If a half-hogshead is used, and there is a nail driven through it, the acid will eat the nail and leak out. He recommended a wooden vat, made like those used by cider-makers, without any metal. His greatest trouble is to get wood ashes. He sometimes tempts the pedler of soap to leave his load with him, and if he set out to collect ashes, would take soap to pay for them in preference to cash. Canada ashes are good if pure. A neighbor of his gets them pure, but they come rather high, — about thirty-three cents per bushel. Dr. Nichols says that ashes will cut or saponify finely ground bones in a few hours, and that it is not necessary to spend two or three weeks, and there would be a saving in ammonia as well as in time. Some scientific men say that plaster drives off ammonia, but Dr. Nichols says it does not. The speaker uses bone and wood ashes as he does stable manure — all he can get. He thought bone and ashes should be applied in the fall, or in very early spring, to have the effect show the first year. The second crop is often benefited more than the first. It

takes some time for it to become mixed with the soil. Bone alone is of little value the first year, even when ground fine. Ashes alone do not act as soon as he used to think they did. He does not think they benefit cabbages the first year. In an experiment with ashes applied late in spring, on a square rod of grass, the product weighed half a pound less than on the adjoining square rod; but after the fall rains the effect of the ashes was seen. He doubts whether ashes affect young corn so promptly as is supposed, though they might if used in connection with hen manure. His soil is a sandy loam, not very light.

Major Emery said that in Dover ashes are much used on grass on clay soils, and the effect is seen the first year, and will last about four years.

Mr. Hills said that his father-in-law uses all the unleached ashes he can get, and has the handsomest growth of timothy he ever saw.

President Moore feared that Mr. Hills's statement in regard to the difficulty of dissolving bones in acid might be misleading. He had dissolved many tons of bones in acid and there is no trouble about it when you know how. He used an old feed-trough, putting in a hundred pounds of bones, and then mixing fifty pounds of acid with the same bulk (not weight) of water in a tub, and pouring it on the bones, and stirring it up with long-handled hoes. The greatest difficulty comes from the mixture being in a wet state. He uses plaster or dry soil to assist in drying it. If too much acid is used it is left of the consistency of melted India-rubber. He had dissolved whole bones with acid, but it is very difficult, and he advised those present not to try to dissolve any but pretty fine bone. Bone cannot be ground fine enough for plants to take up without being dissolved.

O. B. Hadwen said that, from the statements made here today, we can conclude that finely ground bone and potash are excellent food for crops. He had used many tons of each, and had never failed, when they were properly applied, to get good results. In Mr. Hills's experiment there was probably not rain enough to dissolve the potash in the ashes; crops cannot take up food until it is presented to them in solution. The most natural source of potash — wood ashes — is getting short. If near a city a farmer can avail himself to a certain extent of stable manure, but away from the city he must use commercial fertilizers, and we can sum up the matter by saying that potash and bone are the cheapest.

Mr. Hills did not want to leave the impression that he did not

approve of ashes as a fertilizer. The other fertilizers, applied at the same time with the ashes in his experiment, gave excellent results. Perhaps if he had applied the ashes earlier in the season he might have seen the result earlier. He uses nearly all his ashes in combination with bone, believing that when so mixed and heated up both are in a better form for plant food. He has a great opinion of ashes, but would like to see the effect of his manures immediately.

President Moore suggested that there might have been sufficient potash in Mr. Hills's soil before the ashes were applied. The asparagus bed before mentioned was on a high, dry, sandy loam. The natural growth was pitch pine; this had been cut off about twenty-five years before, and the land allowed to run wild; there was not a stick on it worth saving. He applied eight hundred pounds of steamed, dried, and ground bone, and five hundred pounds of muriate of potash to the acre, early in spring. They were mixed together before applying, and no other fertilizer was used. He gets as good asparagus there as anywhere. The ground had never been cropped before the asparagus was planted. The carting of stable manure and working it into the ground would have cost nearly as much as the bone and potash used. He has a vineyard on the same soil, which is underlaid at the depth of about two and a half feet with stones as large as paving-stones, and has cobble-stones mixed through it, so that he had to use a crow-bar in digging holes for a grape trellis. The grapes planted there do not suffer from drought; the roots run down about fifteen or sixteen inches, the ground being ploughed to that depth. The cobble-stones are left for mulching. Professor Stockbridge told him that, if he were in the western part of the State, they would put him in an insane asylum if he attempted to cultivate such land.

Mr. Strong thought the statement of the President most surprising. When he saw his (the President's) vineyard on such a soil as had just been described it was a great surprise to him that it should do so well, but his surprise was still greater in regard to the asparagus, our ideas of its requirements are so different. He thought that, while the effect of bone meal is immediate, it is also more or less lasting.

President Moore thought that bone and potash are far better than stable manure for fruit of any kind. The color and flavor of fruit are affected by the fertilizers used. He believes that the color and quality of his peaches have been improved by the potash

applied. When the Garden Committee visited the peach orchard of Mr. Miles, in Concord, which was then bearing a great crop, they were surprised to find the fruit on the speaker's trees much higher colored and higher flavored. This orchard was on the same sandy soil as the asparagus bed before spoken of. Excepting that they make cultivation more difficult the stones are a benefit to the ground. They keep the soil moist, like a mulch. Professor Goessmann thinks that certain applications will affect the flavor of fruit, and is now experimenting on this point.

Mr. Hills had a small Benoni apple tree in soil so poor that it made neither wood nor fruit, to which he applied a peck of ashes in midsummer, and the next year it made a foot of growth and was overburdened with fruit. This answered the question whether his soil had not ashes enough already.

Samuel Hartwell said that he uses a ton each of ashes and bone annually on his asparagus with so good results that he will continue the practice, and might also apply them on his peach orchard.

Asa Clement said that he bought raw bones for fifty cents per hundred pounds, and broke them with a sledge-hammer, and reduced them by packing in ashes, or by dissolving in potash. He got good results, but it was too much work to break the bones in that way. He preferred to use steamed bones, which must have acid to dissolve them. He had been unable to find any place where he could get raw bones ground.

The Chairman of the Committee on Discussion remarked that, though disappointed by the non-arrival of the essayist, the meeting had been most instructive. All present knew something which they did not know when they came here. He announced for the next Saturday a paper on "The Leaf as a Study," by Dr. G. Austin Bowen.

BUSINESS MEETING.

Saturday, February 28, 1885.

An adjourned meeting of the Society was holden at 11 o'clock, the President, John B. Moore, in the chair.

No business being brought before the meeting, it adjourned to Saturday, March 7.

MEETING FOR DISCUSSION.

The Leaf as a Physical Study.

By George Austin Bowen, M.D., Woodstock, Conn.

A consideration of the little things of life is often of more direct advantage and greater interest than the study of the larger and more elaborate subjects which present at once their every feature and detail, leaving nothing of note or promise to be discovered by a critical examination. In this connection the subject of today will, I trust, repay us for a closer inspection than at the first glance would be thought possible.

How utterly insignificant appears the leaf as among its myriads of fellows upon a lofty bough in summer it quivers with every breath of passing wind, — quivers and gyrates with an unending rhythmical motion, as though, impatient with its circumscribed life, it would gladly sever its connection with its parent twig and seek a position less obscure; or when, with the quickening breeze, life brightens, and it seems to frolic and laugh with its companions as they bow and flutter to its boisterous caress; or in those golden days of autumn when the air is hushed and still, as though fearful of breaking the charm that has cast its magic spell over all nature, and the view over fields and hills shows that softened hue so pleasing to the eye, and we see the leaf, now still and quiet, receive its long-anticipated freedom, and flutteringly fall in many a graceful circle to the dampened earth, to be again lost to thought and vision amid the multitude, piled many inches deep; or, again, when the searching and piercing wintry winds have routed it out from its obscurity, and with many a rude buffet sent it scurrying down the frozen street, playing with it for a moment in some sheltered corner, then carrying it high in air and toying with it an instant before carrying it away from vision, to be lost in some obscure place, there to silently moulder away and become a portion of this life-sustaining earth. So small a thing as a leaf, ruthlessly torn and strewn by the fingers of the thoughtless school-girl, or crushed beneath the tread of the dainty maiden as she saunters through the wooded by-way, unnoted because of multitude, of little interest to us because common, — this little leaf and its kindred must serve us for a theme today, and, if we study it well, we shall see that out of this infinitesimal comes a grand and glorious page of nature, resplendent with beauty, showing

plan, purpose, and design, and results therefrom stupendous in magnitude.

Let us consider the leaf in that broad view adopted by the physiologist, who looks upon it as a part of matter, having its functions to perform, and its relationship to other great creative powers of nature. The botanist must take the second position; and to him we will leave the details of classification and scientific arrangement, which, though important and absolutely necessary when we study it as scientists to unlock the secrets of nature, are unnecessary to our present purpose.

The word leaf is of Saxon origin, and means broad and flat, — just what the leaf is. It is a characteristic word of that strong and expressive language.

Before we have the leaf we have the bud, which consists of a brief cone-shaped axis with a tender growing point, bearing a protective covering of imbricated scales and incipient leaves. Within this bud the botanist will point out to us the rudimentary leaf and bud envelopes, and will classify with the greatest minuteness the various characters therein presented, and a day could be profitably spent with him in considering the vernation of the bud alone; but as physiologists we pass on.

During my lonesome drives in spring-time I have whiled away many weary hours, and shortened the miles, by noting the bud development of our native trees and shrubs. Nothing can be more satisfactory to the lover of nature than to witness this evidence of awakening vitality, for it tells him that the inclement season has passed, and that the beauties of the spring-time are at hand. The great swollen buds, with their varnished surfaces, can present to the thoughtful man a sermon of trust and immortality, more pregnant with everlasting truths than all the theological reasonings we hear from the pulpits.

The growing bud throws off its now useless scales, and we have the miniature leaf before us; tender in its fibre, delicate in its tracery of outline, and beautiful beyond the painter's art in its softened coloring. A few days of warm sunshine and balmy winds, and what a change has taken place upon the whole face of the country! Every shrub and tree is loaded with verdure; bleak woodlands are now delightful resorts, and the brown fields are transformed into seas of emerald; hundreds of thousands of tons of foliage have appeared — from whence?

The leaf is full grown, and from now till fall carries on its

peculiar functions, which present questions of intense interest to the student of nature.

Anatomically considered the leaf is a portion of the substance of the bark, expanded into a broad, thin plate by means of a woody framework, or skeleton, issuing from the inner part of the stem. This plate is called the lamina, or blade of the leaf, and consists of two parts, the framework and the parenchyma. The framework is made up from the branching vessels of the foot-stalks; which are woody tubes pervading the parenchyma, and carrying nourishment to every part. From the analogy of their functions these vessels are called veins. The parenchyma consists of two parts or strata, more or less distinct; arranged differently in different leaves according as their natural position is horizontal or vertical. Externally the leaf is covered with a layer of empty, united cells, mostly tubular, forming a superficial membrane called the epidermis, which is analogous to the cuticle that covers our own bodies. Its office in the leaf is to check evaporation. The surface of the parenchyma, immediately beneath the epidermis, is composed of one or two layers of oblong cells, placed perpendicularly to that surface, and more compact than the layer of cells beneath them, which constitutes the lower stratum, and which contains in addition, in common with the whole epidermis, the stomata, or mouths, which are little clefts through the epidermis, and are always placed over and communicate with the intercellular passages. These little openings are guarded by valves, which are supposed to regulate transpiration. The number of these mouths, or stomata, is simply astonishing. A single square inch of surface of the leaf of the common garden rhubarb contains 5,000, the garden iris 12,000, the pink 36,000, and the hydrangea 160,000. Note the immense number of them. We shall allude to this point further on. Our leaf is also provided with glands, which are cellular structures, serving to elaborate and hold the peculiar secretions of the plant, such as aromatic oils, resins, honey, poisons, etc. A gland may be merely an expanded cell at the summit or base of a hair, or it may be a peculiar cell under the epidermis, giving to the organ a punctate appearance, as in the leaf of the lemon. Other glands are compound, and are either external, as in the sundew, or internal reservoirs of secretions, as in the rind of the orange. Whatever their construction or position, they are important adjuncts to the legitimate office of the leaf.

The beautiful green of the leaf, so restful to the eye, is a waxy substance termed chlorophyl (*chloros*, green, and *phyllon*, a leaf). It is soluble in chloroform and ether, but insoluble in water, and floats in the fluid of the cells as minute granules. The light of the sun seems to be essential to its formation. Although found in vast abundance in the vegetable kingdom, hundreds of tons being everywhere about us, chemists can tell, or have told us, but very little about it. They have not yet ascertained its component elements, much less their relative proportions. They cannot tell whether it contains iron or nitrogen; they have only got so far that they can say it is never produced in the absence of compounds capable of supplying those elements. It is possible that it may contain more than one substance, or that the leaf green of all plants is not in every respect identical. Chlorophyl is found in those cells of plants where the absorption and decomposition of carbonic acid gas go on; with which characteristic process of vegetable life it is closely connected. Thus starch granules are formed in the midst of a complex material, to which the name of protoplasm is given, this formative material being dyed as it were with chlorophyl. It is then extremely probable that chlorophyl, under the sun's radiant energy, stands, in relation to carbonic acid gas which is decomposed by plants, in very much the same position of importance that hæmaglobin does to the gas of our own blood; showing that the principle called "life" in the vegetable kingdom is similar to that in the animal. Solutions of chlorophyl present a very fickle color when viewed in different positions, being either bright green, opaque red, or vermilion.

A second coloring matter is also found, common alike to fruits and flowers; as in the leaves of the red cabbage, the skin of the grape, and in that majestic queen of the garden, the dahlia. It has passed at different times under various names; but now I believe colein is the term most generally accepted, from coleus, a genus of plants in many species of which it occurs abundantly. It is generally very irregular in distribution; and might be called one of the curiosities of the leaf, as it has no important office to fulfil. The chemist is full of information regarding this principle, and gives as its percentage composition, — carbon, 57.7; hydrogen, 4.7; oxygen, 37.6; making it identical with the coloring matter of red wine and most red, blue, and purple flowers and fruits, and with the red pigment of some of the varieties of the beech; for with ammonia it becomes violet, indigo, green, and yellow. May we not

look for the cause of our brilliant autumn colors to these chemical changes? Coleiu is not to be confounded with that other color material of plants, the well-known madder, so long used to dye the color called Turkish red, which is a principle of the root and not the leaf, — at least it is not stored in the leaf as are the others.

These are dry facts, perhaps; but ever since my early school days I have noticed that the drier the fact the more solicitous some one appeared to be that I should learn it. It now seems to be my turn to present, or recall, a few dry facts to your minds.

Thus we have the leaf, beautiful in its design, elaborate in its construction, presenting the same general characters, whether grown on the land or in the water, and varying in size from the diminutive, almost microscopic, leaf to that of the renowned and gigantic *Victoria regia*, which, in the waters of its native Guiana, presents a surface of eight, twelve, or even fifteen feet in diameter. The attenuated leaves of the far northern forests, although excelled by the profuse unfolding of those of the tropics with their unending variety of form and coloring, and anomalies of structure and habit, give us nevertheless the same physiological conditions, which, briefly stated, are as follows, and are all included under the term aeration, or respiration, which is of the same vital importance in the vegetable world as it is in the animal: —

1. The absorption of carbonic acid ($C\ O_2$) from the air under the stimulating influence of the sun's light.
2. The absorption of oxygen (O) when the influence of the sun's light is obscured or removed.
3. The formation of carbonic acid by the union of the oxygen thus obtained with the free or nascent carbon already in the tissues.
4. The assimilation of carbonic acid from whatever source it may be derived, which process, under the sun's light, decomposes the carbonic acid, retaining the carbon; and
5. Eliminating the oxygen, — one of the greatest functions of the leaf.
6. The exhalation of carbonic acid when the sun's rays are obscured, or darkness prevails.
7. The reduction of the volume of sap by transpiration.

We see by this enumeration that there are two phases of respiration, seemingly directly opposed to each other, and evidently

occasioned by the light and heat of the sun. Surely we ought to derive satisfaction from the thought that, as we till our fields during the intense heat of the summer, the sunlight that exhausts us is at the same time giving us more oxygen to breathe, and is storing up food for our future sustenance in the plant we cultivate. The thought will not render the toil less fatiguing, but the consolation comes from the knowledge that we get the upper hand of nature when we harvest the crop.

To understand the full office of the leaf we must know that the sap that flows so freely in the spring is largely composed of water absorbed by the roots of the plants. This water holds in solution minute quantities of gas and mineral salts, and adds thereto on its upward way dextrine and sugar, which it dissolves out of the cells as it comes in contact with them, gaining in density as it nears the leaf. Within the leaf it parts with much of its water, having no longer a use therefor, receiving in its place carbon, and the digested juices acted upon by the chlorophyl, as it passes through the surface of the leaf; from thence, by means of the leaf-stalk, it passes into the cellular and woody tissues of the bark, and continues its downward passage, making deposits of food, first in the cells of the pith at the base of every incipient bud; then a copious store in the cambium region; giving also a good portion to the medullary rays, some to be carried outward to the cortical layer, and some inward for solidifying the wood; and lastly the richest portion is sent to the root, every branch and fibre being filled. The return sap also contains nitrogen, to a limited extent, and minute portions of mineral matter. From this nitrogen are first organized the protein substances, analogous in composition to the living tissues of animals; and cellulose, the peculiar principle of vegetable tissue, having in it the exact elements of water, $C_{12}\ H_{10}\ O_{10}$. The action of chlorophyl upon this substance develops gum, sugar, and starch, which are nutritive products common to all plants, and are stored away for future use, as fat is stored away in our own and all animal systems. As examples we have sugar stored up in the root of the beet, and in the stalks of corn, sugar-cane, and sorghum; and starch in the tubers of the potato. These substances, with cellulose, are all composed of carbon and the elements of water, often in identical proportions. Thus, cane sugar, $C_{12}\ H_{12}\ O_{12}$; grape sugar, $C_{12}\ H_{11}\ O_{11}$; gum, $C_{12}\ H_{10}\ O_{10}$; starch, $C_{12}\ H_{10}\ O_{10}$; cellulose, $C_{12}\ H_{10}\ O_{10}$. The ease with which these five general products of leaf elaboration are converted into one another, both in the growing plant and in the

chemist's laboratory, is accounted for by the similarity of their chemical conditions. Thus, starch, gum, and cellulose may reconvert by some change in the arrangement of their constituent atoms, or they may become sugar by the addition of one or two atoms of water.

Thus we have the physiological action of the leaf, presenting to the scientific mind one of the most interesting pages of nature's hand-book. It is an interesting study, not alone because curious, but because it has had no little part to perform in rendering this world habitable for man. In a brief glance at its action in this connection we recognize its relationship to our soil, which we know to consist of two parts, the mineral and the organic. The mineral is but the disintegrated and pulverized rock, containing, to be sure, many ingredients that enter into the composition of plants, such as potassa, soda, silica, and the universal lime, all more or less soluble in water. But what would our soil be if this were all? It would be but a collection of rocky hills and sandy wastes, like the great Sahara. But, mingled with the mineral matter, we find the organic matter, which consists of the remains of former tribes of plants and animals, and the products of their decomposition, carbonic acid and ammonia. But, as the earth supported vegetable life before it did animal, we see the important place given to our little leaf; year after year, century after century, age after age, has the leaf gone on elaborating the juices of plants, extracting carbon from the air and leaving, by the final decay that comes to all, its organism to the soil, making it such as we have it today, a life-supporting element, affording, in its tillage, the occupation of a large majority of civilized men.

But it is not the soil alone that has been created by the instrumentality of our hastily surveyed leaf, for we find within its depths hidden stores of coal and petroleum, enough to last for centuries to come. From whence came they? What has our perishable leaf to do with the formation of coal? It placed it there. That is, it developed the gigantic pines, ferns, and lycopodiums from which it was composed, and in doing so may have had much to do with rendering our atmosphere respirable for animals. We are indebted to M. Brongniart for a very ingenious hypothesis which he has raised upon the fact that an increased quantity of carbon may, under peculiar circumstances, be assimilated by the leaf.[1] He supposes

[1] Carpenter's Principles of Comparative Physiology.

that, at the epoch of the growth of those enormous primeval forests which supplied the material of the coal formation, the atmosphere was highly charged with carbonic acid, as well as with humidity; and that from this source the ferns, lycopodiaceæ, and coniferæ of that era were enabled to attain their gigantic proportions. He imagines that they not only thus converted into organized products an immense amount of carbonic acid which had been previously liberated by some change in the mineral world, but that by removing it from the atmosphere they prepared the earth for the residence of a higher class of animals. It is now regarded by scientists as a fixed fact that the whole vast accumulation of carbon at present in the earth was at one time a component part of the atmosphere, and recent investigations and experiments justify the assertions of M. Brongniart. Five parts in ten thousand is the amount of carbonic acid now contained in our atmosphere, and this seems to be in general as much as plants require; but it is not at all improbable that in those early epochs a higher percentage may have existed, for we know by direct experiment that plants will thrive in an atmosphere of from five to eight per cent of carbonic acid, provided they are supplied with strong sunlight; and we know that in those regions where a larger percentage does exist plants seem to thrive with increased vigor. Thus, in the Lake Solfatara, in Italy, where carbonic acid gas escapes from the bottom with such violence as to give the appearance of ebullition, floating islands are constantly being formed, which consist of confervæ and other simple cellular plants. The celebrated springs of Gottingen, which abound in carbonic acid, are another example; for there, also, we find the surrounding vegetation of increased luxuriance; appearing earlier in spring, and continuing later in autumn. So it may be that the leaf rendered our atmosphere respirable, as well as keeps it so today, by the removal of an ingredient so destructive to animal life.

Let us analyze this a little further. What do we mean by the statement that leaf action is keeping our atmosphere respirable today?

One of the great drawbacks or hindrances to rapid investigation in any of the natural sciences is the temptation to depart from the main line of study, and to search out the side questions; because nature is so complex in her structure that we cannot search one line far without finding it linked and interlinked with those which seem to be of equal, or even greater, importance. Keeping this

in view then, we will content ourselves with the simple statement of the phenomena of animal respiration, without going at all into its interesting details. In the act of respiration the animal absorbs oxygen from the air by means of the blood cells, or disks, which, so to speak, come in contact with it as it is spread out in the tissue of the lungs. At the same time that it absorbs its oxygen it liberates large quantities of carbonic acid gas. Vegetable respiration is the reverse of this: oxygen is eliminated, and carbonic acid gas received. Thus are the two kingdoms of the organic world dependent upon each other, the plant furnishing the oxygen that the animal consumes, and the animal the carbonic acid that the plant consumes. Is there not an evidence of reasoning and design, from some source, in this arrangement?

But the question that comes most pertinently home to us today is, How are we, as farmers and horticulturists, to derive any benefit from a knowledge of leaf physiology? How are our acres to be benefited thereby? Can we insure better and larger crops? I answer, most assuredly, Yes, if we will systematically put in practice the ideas we gain from a study of our subject; not only individually, but collectively, for oftentimes if we would profit by Nature's laws we must enact state and national laws to harmonize with them.

Let us take an example of the latter point. We have all of us suffered more or less from the effects of drought, and we hear much said in connection therewith regarding the preservation of our forests. The press of the country, both agricultural and general, is filled with it at times. The leading arguments seem to be that the dank, moist atmosphere of our woodlands is occasioned by the deep shade from the foliage preventing the sun's warm rays from penetrating and dispersing it by evaporation, and that the soil of woodlands is also protected from the parching effect of the sun's influence and from drying winds; consequently such soils prove to be reservoirs for water, and in time of drought will keep the streams well fed. Undoubtedly these views are correct, and forests do play important parts in lessening the injurious effects of drought; but to my mind there is a stronger reason yet why these leaf treasuries should be carefully guarded. We have seen that the surface of the leaf is abundantly supplied with mouths, or pores, for the transpiration of sap. Numerous experimenters have investigated this subject, and have placed on record many interesting facts connected therewith, which go to show that the quantity of pure

water daily transpired is immense, and that forests make a damp atmosphere for miles around, simply from this transpired matter.

According to Hales, a cabbage presenting a surface of 2,736 square inches exhaled from day to day nineteen ounces, and on some days as high as twenty-five ounces, and these days of twelve hours only; a sunflower from twenty to thirty ounces, etc., etc., long lists being given. According to Johnston, the English agricultural chemist, a field in crop to grain or grass will transpire from 3,000,000 to 5,000,000 pounds of water in its season's growth; an immense amount, we must all acknowledge. We know that a rainfall of one inch is equal to one hundred and one tons of water to the acre. At this ratio, could all this evaporated water be returned in the shape of rain, it would amount to an inch and a half or two inches. If one acre of grass can give a result as wonderful as this, what will be the effect of large tracts devoted to forestry? In this connection we cannot but admire the silent workings of Nature, as, unseen and almost undetected, she carries on these stupendous operations.

The leaves of aquatic plants perform essentially the same offices as those which have their habitat upon the land, and there is reason for the belief that they in no small degree contribute to the purification of the waters wherein they grow, and of which, in many instances, both we and our cattle drink. When our various State legislatures are called upon to pass laws regarding the purification of streams, as in time they will be, and as is now being done in Connecticut, we shall hear more and know more of the action of the leaves of aquatic plants regarding this important office.

We see carbon extracted from the air through the leaf, and stored within the living tissues of plants, — a process universal throughout the whole vegetable world. It is within our province as inquiring agriculturists to follow it still further, and learn of its action within the soil we cultivate; for it becomes incorporated with it, sooner or later, as organic matter, by the decay of vegetable growth. During the decay a portion of the matter escapes in the form of gas; the remainder undergoes a slow process of combustion, leaving the carbon as charcoal, in which form it always remains one of the most indestructible elements. The agricultural value of charcoal does not consist in the fact that it is a component of plants, but upon other offices of great importance which it performs. It makes the soil retentive of manures, because it is one of the greatest absorbents of gases known, receiving them not

alone from the decaying matter of the soil, but from the air as well. Both air and water, in their circulation through a carbonaceous soil, readily part with their fertilizing gases to this greedily absorbing agent. It also gives power to the soil to absorb moisture, because it is itself an absorbent of water. We all know with what great rapidity peaty soils, which are simply carbonaceous soils, absorb moisture, and with what evident reluctance they part with it. Decayed vegetable matter darkens the soil, rendering it warmer; for we all know that a dark surface will absorb more of the sun's rays than a light one. A dark coat is warmer to our backs than a white one, although of the same weight and texture. The decay of vegetable matter is always accompanied by the evolution of heat, — perhaps not sensible to our feelings, but the rootlets of the growing plant realize it and are quick to respond to it. Is there not food for reflection here? Is our little leaf to be despised when its changes and many influences are thus traced out? I think not, for it opens the whole theory of the application of manures, either of our barn-yard composts, or of the so-called commercial fertilizers.

Aside from its utility in agriculture, we can view carbon as a wonderful curiosity of nature, for in its universality of condition we find it varying from lampblack, with its velvety softness, to the unyielding hardness of the brilliant diamond.

The grasses of the world, over six thousand species, or nearly one-sixth of all the flowering plants, can legitimately come within the subject of our inquiry, for they are leading crops in most sections. The principal point is that a leaf, when grown, never changes its form or size, and that when quickly grown its size is far larger than when its formation is slower. The leaves of grass follow this rule; hence would we have large grass we must grow it *quickly*, producing a large leaf, valuable not alone for itself, but because it also adds to the volume of the stem.

The fruit culturist will thoughtfully consider the subject of pruning in its relation to the proportionate capacity of the leaf to the plant and the fruit, and will guard his knife accordingly.

The anatomy of all leafy structures; the physiology depending thereon, including absorption and imbibition; the circulation of nutritive fluids; respiration, exhalation, nutrition or growth, secretion, the evolution of electricity and heat, and the chemistry of leaf action, should all be familiar ground to the agriculturist, for the leaf is the most important portion of the plant, — the busi-

ness portion, so to speak, — and he who would grow his crop well must understand the relationship.

Putting aside its physiological history, and looking at it from a commercial point of view, we see grand and ever-increasing tests of its utility as supplying food or comfort to man. Beginning with our simple garden vegetables whose leaves are edible, we stray from one item to another with augmenting interest, for we find that our subject includes those leaves in vast abundance whose medicinal qualities restore our impaired functions, — tea, the solace of old women, with the leaves of thirty-two different species used as substitutes, and as many more tried and rejected; and tobacco, that vile weed so universally used to soothe the petty and perplexing cares of man. Our little leaf stores up food in the form of grain, and grain we know forms the chief food of man, besides enabling him to get rich on "corners." It furnishes dyes soft and beautiful, and offers the artist subjects for his easel. The decorator copies it to beautify the interior of our homes; the architect refers to it as the first material used in constructing dwellings; and Holy Writ assures us that it was the first article used for clothing by the first human pair in the earliest historic period. The geologist finds its impressions and petrifactions deeply buried within the ground, and infers much of earth's history therefrom; the botanist revels in its unending beauties, and lends his aid to the naturalist in solving the vexed problem of evolution; but to the physiologist alone are its gigantic labors in making this world habitable for man revealed.

Discussion.

William C. Strong thought Dr. Bowen's paper exceedingly interesting. It had been impossible for him to conceive of any means for the production of such vast quantities of carbon as are found in the form of coal, but the theory that plants formerly had the power of absorbing more carbonic acid than they do now might account for these deposits. The remarks of the essayist on this point had suggested to him whether it would be possible to produce in our plant houses an atmosphere with an excess of carbonic acid gas, as in the primeval ages, and thereby to increase the luxuriance of growth. The possibilities of vegetable growth, as seen in the tropics and sometimes in greenhouses, are extraordinary. A single eye-cutting of a grape vine has in one season made a growth of thirty-six feet.

Dr. Bowen thought it would be difficult to introduce carbonic acid gas into plant houses without shutting off ventilation. Owing to the diffusibility of gases, without which we should have layers of gases on the surface of the earth, carbonic acid gas rises from the bottom and mingles with the air. M. Brongniart's theory as to the abundance of carbonic acid gas, and the growth of primeval forests occasioned by it, has been very carefully examined. This extraordinary luxuriance is one of the greatest curiosities, physiologically considered, of plant growth.

Francis H. Appleton said that he had always looked on leaf-mould as most desirable in gardening, but he found it difficult to accumulate enough.

Dr. Bowen said, in answer to an inquiry, that few animal remains are found in coal beds. The gigantic animals appeared later, and were partially dependent on the luxuriant growth of leaves for their support. It is a question whether there were any larger animals in early ages than the whales of the present day. The gigantic lizards were scattered over a long time; there were only one or two species at any one epoch.

Henry Ross said that he had gathered all kinds of leaves, but had thought pine leaves rather injurious to plants. He uses them for covering, but finds them difficult to remove in spring.

Dr. Bowen knew no reason why pine leaves should be injurious. They would not absorb the sun's rays as much, and they do not contain as much fertilizing material as those of deciduous trees, and hence there might be some difference in two beds covered with these two kinds of leaves. Pine leaves contain a gum which is difficult to dissolve, and therefore are longer in decomposing. They make good bedding, though they have not much absorbent property. All leaves contain crystals of oxalate of lime, which has a little fertilizing value.

Mr. Strong remarked that few plants grow under pine trees.

Dr. Bowen thought this was owing to the thick mulch formed by the pine leaves, and the dense shade, rather than to any injurious substances in the leaves.

A. W. Cheever said that he had used pine needles as a covering for strawberries, and considered it the best he had ever tried. They keep down weeds. He had ploughed them in when he planted corn and other crops with no injurious effect.

Benjamin G. Smith said that one of the best gardeners in the Society recommended pine leaves as a mulch for strawberries.

Dr. Bowen said, in answer to an inquiry, that oak leaves are long in decaying, and partially decayed leaves have the power of holding moisture.

The subject for the next week was announced as the "Propagation of Trees from Seeds," to be opened with a paper by Jackson Dawson, gardener at the Arnold Arboretum.

BUSINESS MEETING.

SATURDAY, March 7, 1885.

An adjourned meeting of the Society was holden at 11 o'clock, the President, JOHN B. MOORE, in the chair.

William C. Strong moved that a Committee of five be appointed to consider and report what amendments, if any, are necessary to the Constitution and By-laws. The motion was unanimously carried, and the Chair appointed as that Committee, Mr. Strong, Edward L. Beard, E. W. Wood, C. H. B. Breck, and Samuel Hartwell.

Charles M. Hovey moved that the doors between the Library room and the office of the Treasurer and Superintendent be opened at proper times. On motion of William H. Spooner it was unanimously voted that Mr. Hovey's motion be laid on the table.

Adjourned to Saturday, March 14.

MEETING FOR DISCUSSION.

THE PROPAGATION OF TREES AND SHRUBS FROM SEED.

By JACKSON DAWSON, Jamaica Plain.

I have been asked to make a few remarks on the raising of trees and shrubs from seed. It is an old subject, and one that has been spoken and written on from time immemorial until the present day; so that I feel as if I had nothing new to tell. But we are a new generation, and, notwithstanding all that has been said upon the subject in the past, there are many among us who hardly know

anything about the life of a tree, or how long it takes a seed to germinate; and scarcely give any thought to a matter which should now attract the attention of every intelligent observer of nature who takes an interest in the forest wealth of our country. And there is no reason why every man, who has a lot of barren land, should not plant and care for a few acres of trees every year, using the kinds most suitable to the soil of his farm, and thereby securing a permanent investment for his children, as well as adding to the resources of his country. Our forests are fast disappearing, and if we keep on doing in the coming generation as we have done in the past we shall soon have a country of barren hills and treeless plains. Our watercourses will be torrents in the spring, and dry, gravelly beds the rest of the year. I might mention a few of the causes of the destruction of trees that could be prevented. *First.* The woodman, who cuts all that is of any use to him in a commercial way, and destroys all, or nearly all, that is left. *Second.* Forest fires, which are our greatest curse, in whatever way they may originate, — it may be a spark from a locomotive, a wad from the gun of some sportsman, or the smouldering fire left by some camper-out, which has been blown about by the rising wind; these often start fires that may destroy much valuable property. Many people do not think of the value of a tree, and do not care where a fire may end so long as it does not affect their interest. I have seen many acres of woodland burning, not ten miles from Boston, and no one attempted to stop it until it threatened to burn some little shed; then the whole community turned out to stop it, but as long as it kept in the woods they did not care. This matter should be looked into, and strict laws be made, which would protect all who might plant trees or forests; for they are one of the greatest sources of national wealth and comfort. I might say that there is scarcely a business that can be successfully carried on without the use of forest trees or their productions.

But I am getting away from my subject. The raising of trees from seed is the natural way of propagating them. Nature shows us that, and employs many agents to carry out her designs. In the first place, seeds drop from the trees to the ground and are covered by the falling leaves, or by the grass and weeds, which keep them from the drying winds until they germinate. They are scattered by the winds, and many fall in the crevices of rocks, and on good ground, or other favorable situations; they are floated down rivers and brooks and are left in the rich mud along the banks. They

are carried many miles from their original station by the birds; and the larger seeds, such as acorns and nuts, are carried away by squirrels, mice, and other animals, and buried for future use as food, and a great many of these germinate. I think that for many rows of fine oaks and hickories along the boundary walls of old farms we are indebted to the planting of the squirrels. While we can learn much from nature, we can also improve upon her methods, and supply ourselves with trees in a more economical way. It is true, if nature is left to herself, and men stop destroying, she will soon cover up the ruins made by man, for she sows with a liberal hand; but there are so many enemies at work, and so many conditions to take into consideration, that only a small percentage of the seed that drops to the ground germinates; possibly not one in a thousand comes to maturity. For this reason we cannot afford to raise our forests as nature shows us.

The sowing of tree seed where the trees are to remain is poor economy, and should not be undertaken except where it is impossible to plant; such sowing should be the exception, not the rule. A much greater quantity of seed is required; it necessitates more labor; more spots have to be replanted, and it is not generally satisfactory in its results. The soil and situation are so varied that the seed cannot be properly cared for, as it can be in the compact form of frames, seed beds, or nursery rows, where they can be protected from insects or inclement weather.

The first consideration in seed-sowing is to determine what you want to plant; the second, to procure your seed as fresh as possible; the third, to prepare a suitable soil and situation to plant them in; the fourth, to know what depth to cover them and how long to wait for the seed to come up. It would be impossible for me at this time to go through the whole list of trees and shrubs that would stand the climate of New England; therefore I will confine myself to those that are most useful. Except in a few cases given for the sake of illustration, those named in the following list are all hardy in the vicinity of Boston, and are representatives of most of the families of trees that will stand our climate: —

Acer rubrum,	Red Maple,
" *saccharinum*,	Sugar "
" *dasycarpum*,	White "
" *platanoides*,	Norway "
Æsculus Hippocastanum,	Horse Chestnut,

Ailanthus glandulosa,	Tree of Heaven,
Alnus glutinosa,	European Alder,
Amelanchier Canadensis and varieties,	Shad-bush,
Betula papyracea,	Paper Birch,
" *lenta*,	Black or Cherry Birch,
" *nigra*,	Red or River "
" *alba*,	English White "
Carpinus Caroliniana,	Hornbeam,
Carya alba,	Shell-bark Hickory,
" *sulcata*,	Western Shell-bark Hickory,
" *porcina*,	Pig-nut,
" *amara*,	Bitter-nut.
Castanea vulgaris var. *Americana*,	American Chestnut,
Castanea pumila,	Chinquapin,
Catalpa bignonioides,	Catalpa,
" *speciosa*,	Western Catalpa,
Celtis occidentalis,	Nettle tree or Hackberry,
Cercis Canadensis,	Judas tree,
Cladrastis tinctoria,	Yellow-wood,
Cornus florida,	Flowering Dogwood,
Cratægus Crus-galli,	Cockspur Thorn,
" *tomentosa*,	Black or Pear Thorn,
Cercidiphyllum Japonicum,	
Diospyros Virginiana,	Persimmon,
Fagus ferruginea,	American Beech,
" *sylvatica*,	English "
Fraxinus Americana,	White Ash,
" *pubescens*,	Downy "
" *sambucifolia*,	Water "
" *excelsior*,	English "
Gleditschia triacanthos,	Three-thorned Acacia,
Gymnocladus Canadensis,	Kentucky Coffee tree,
Ilex opaca,	American Holly,
Juglans cinerea,	Butternut,
" *nigra*,	Black Walnut,
Kalmia latifolia,	Mountain Laurel,
Liriodendron Tulipifera,	Tulip tree,
Magnolia acuminata,	Cucumber tree,
" *cordata*,	Yellow Cucumber tree,
" *Umbrella*,	Umbrella tree,

Morus rubra,	Red Mulberry,
" *alba*,	White "
Nyssa multiflora,	Tupelo, or Sour Gum,
Ostrya Virginica,	Hop-Hornbeam,
Pirus Americana,	American Mountain Ash,
Platanus occidentalis,	Button-ball tree,
Populus balsamifera,	Balm of Gilead,
Phellodendron Amurense,	Amoor Cork tree.
Prunus serotina,	Wild Black Cherry,
Quercus alba,	White Oak,
" *bicolor*,	Swamp White Oak,
" *palustris*,	Pin Oak,
" *rubra*,	Red "
" *coccinea*,	Yellow-barked Oak,
Rhododendron maximum,	Great Laurel,
Robinia Pseudacacia,	Locust,
Salix alba,	White Willow,
Sassafras officinale,	Sassafras,
Tilia Americana,	Basswood,
" *Europæa*,	Linden,
Ulmus Americana,	White Elm,
" *racemosa*,	Corky "
" *campestris*,	English "
" *montana*,	Scotch "
Viburnum Lentago,	Wayfaring tree,
Taxus baccata var. *Canadensis*,	American Yew,
Ginkgo biloba,	Maiden-Hair tree,
Larix Europæa,	European Larch,
Juniperus Virginiana,	Red Cedar,
Thuja occidentalis,	American Arbor Vitæ,
Abies balsamea,	Balsam Fir,
" *concolor*,	Rocky Mountain Silver Fir,
" *pectinata*,	European Silver Fir,
Tsuga (*Abies*) *Canadensis*,	Hemlock,
Pseudotsuga (*Abies*) *Douglasii*,	Douglas Fir,
Picea nigra,	Black Spruce,
" *alba*,	White "
" *pungens*,	Colorado Spruce,
" *excelsa*,	Norway Spruce,
Pinus Strobus,	White Pine,
" *resinosa*,	Red "

Pinus rigida,	Pitch Pine,
" *sylvestris*,	Scotch "
" *Austriaca*,	Austrian Pine.

As you perceive, the majority of this list are American trees. I know there are many foreign trees that will do well in New England, but, without being partial, I must say I believe that with few exceptions American trees are the best in the American climate, both for use and profit; and in almost all undertakings in this country the first question is, Does it pay? Of course we have those among us who take a special delight in all that is beautiful, and gather together from all parts of the world everything in the plant line that can be grown in our climate. Such men are public benefactors, but we have too few of them; most of those who plant want to reap the benefit, either directly or indirectly, as soon as possible, and to such I say, Let us plant American trees.

Soil and Situation. — In selecting a place for the seed beds the soil for all large seeds should, if possible, be a deep, rich, mellow loam, avoiding, if possible, all thin, gravelly soils or heavy clays. The soil should be well manured with good, rotten manure, one year old, and ploughed or trenched from twelve to fifteen inches deep, and well pulverized with a harrow. All coarse stones, quitch-grass, or other rubbish, should be raked off so as to have the land in the finest condition possible. If the land is full of weeds it would be well to manure heavily and plant one year with crops that would be well cultivated; or to plough it frequently during one season, so that it may be as clean as possible when the time comes for sowing. If there is anything that tries one's patience, it is attempting to grow seedlings in a soil that is already full of weed seed. The land should be well sheltered from the north and west winds, either by a hedge or fence. If it is springy or low it should be well drained. If the seeds are to be sown in beds they should be laid out five feet wide, with an alley or pathway two and a half feet wide; this will give ample room to work the beds from both sides. The beds should be raked fine, and if to be sown broadcast they will then be ready for the seed. A great many people prefer to sow broadcast; but I think that method requires more labor and care in weeding. I prefer to sow in rows nine inches apart across the bed, — especially if there are a large number of varieties, or only a limited number of plants are wanted, — or in long nursery rows eighteen inches apart if to be worked by hand, or from two and a half

to three feet if to be cultivated by horse-power. The reason I prefer the short rows is that in beds so planted you can keep the soil well stirred between them, which you cannot well do when sown broadcast; they are also easier to shade and water, if necessary, than the long nursery rows, and in the fall they are much more easily protected.

Sowing. — The seeds should never be sown when the ground is wet, or when it is raining; the soil at the time of sowing should be neither wet nor dry, but in such condition that it can be raked without clogging. If sown when wet the soil is apt to bake hard, and a great many seeds will scarcely come through, while, on the other hand, if the soil is too dry the seed is apt to work out unless covered deeper than is desirable.

A supply of water should always be at hand ready to use during dry weather on all light-rooted plants; but for large, deep-rooted plants this is unnecessary, except in protracted droughts. It is also well to have a number of light lath screens to shelter the most delicate plants from the hot sun. Having the ground well prepared, and all else necessary, we can begin sowing as soon as we can get the seed. If in the fall, we begin with the oaks, as acorns do not long retain their vitality, out of the ground. Neither does the seed of chestnut, chinquapin, hickory, or beech. To insure good success these must all be planted, or put in boxes of earth, as soon as possible. If sown broadcast the nuts should be scattered thinly and evenly over the bed, pressed down with a light wooden roller, or the back of a spade, and covered a little more than the diameter of the seed, — which would be nearly an inch for beech, chestnut, and oak, and from one to two inches for hickory, black walnut, butternut, and horse chestnut. If the same seeds are sown in drills they should be from two to three inches deep, and from one to two inches apart in the row. If not pressed down they will need from half an inch to an inch more covering than those pressed down. Some prefer to make shallow drills with a plough and sow the nuts very thickly; this will give a great many more plants to a given space, but they will not be so strong.

The Maples, with the exception of *Acer rubrum* and *Acer dasycarpum* (these two species ripen their fruit in May and June), should be sown as soon as possible after gathering, and, whether in drills or broadcast, should not be covered more than twice their diameter. If covered too deep they sprout and rot, not having strength enough to break through a great depth of soil. If maple

seed is allowed to get thoroughly dry, and is kept so until spring, very few, if any, will come up until the second year; while, if sown as soon as gathered and subjected to a good freezing, the greater portion will come up the following spring; though a few may wait until the second year.

The Ash (Fraxinus) must also be sown as soon after gathering as possible, if wanted to come up the first year. The Carpinus (Hornbeam) and the Ostrya (Hop-Hornbeam), unless sown in the autumn, will not come up until the second year. The Nyssa (Tupelo), *Cornus florida*, *Amelanchier Canadensis* (Shad-bush), *Celtis occidentalis*, the viburnums and thorns, seldom come until the second year, although there are a few exceptions, as some varieties will come if exposed to freezing, while of others not a seed will germinate even if frozen. The plum, peach, apple, and pear never come up evenly the first year unless the seed has been frozen or kept in boxes of moist earth. A great many roses will not come up the first year, even after having been frozen, although the seed of hybrids will, if frozen for a week or two, come up in less than a month. The Tulip Tree invariably takes two years, and, as the proportion of good seed is as one to ten, it should be sown very thickly to insure even an ordinary crop. I find a good plan, which saves much time and labor, is to take some good-sized boxes, and fill with seed and fine sand in alternate layers; burying the box in a well-sheltered place and leaving it there one season, lifting out the sand in the spring and sowing the seed thickly in rows, and covering lightly.

Such seeds as those of *Cercis Canadensis*, *Gleditschia triacanthos*, *Cladrastis tinctoria*, and *Gymnocladus Canadensis*, being very hard, should have boiling water poured over them, and then stand for twenty-four hours, when they may be passed through a sieve, the mesh of which corresponds to the size of the seeds to be operated upon. All those not passing through the sieve may be considered fit for sowing, while the rest should be treated to another hot bath until they have all swollen to the required size. If sown dry they will keep coming up a few at a time for a year or two. The Ailanthus, Catalpa, Morus, Platanus, Birches, and Alders are best sown in spring, as soon as the ground is dry enough to work. The ground should be very fine, and, whether in beds, broadcast, or in drills, the seed should be very lightly covered; and if a slight screen or shade were used it would be of great benefit to the young seed-

lings until they had made the second or third rough leaf, when the shade could gradually be dispensed with.

The White and Scarlet Maple, the Elms, and *Betula nigra* ripen their seed in early summer, and should be sown in freshly prepared beds as soon as gathered. At this time of the year the weather is often quite warm and dry, therefore these summer-sown seeds should be carefully attended to as regards watering, and possibly light shade should be given. Where a large amount is planted, and no screens are at hand, birch brush laid thinly over the bed is a great help. If well taken care of they will make plants from six to twelve inches high the same season. I would say, before going further, that my rule is always to cover seed sown out of doors in any ordinary loamy earth a little more than their own diameter, and if very light and sandy nearly twice as deep, but if the soil is a clay, as lightly as possible; and it makes no difference whether broadcast or in drills. I know there are a few trees whose seed will come up if covered quite deep, but they are exceptions, not the rule.

The Magnolia should not be sown out of doors in this climate before the 20th of May, as it does not do well if sown when the ground is cold. The Holly (*Ilex opaca*) is the slowest to germinate. Treated like other seeds, a few — say one in a thousand — will come up in the first year, a few hundreds the second year, and the remainder the third year. Such has been my experience. The Black Alder takes two years.

Such seeds as those of Magnolia, Rose, Mountain Ash, Cratægus, Celastrus, Euonymus, and Viburnum, which are inclosed in a fleshy pericarp or pulp, where space is of account, and also for convenience of sowing, I macerate in water at seventy or eighty degrees for one or two weeks, when they may be washed out and sown before they are thoroughly dry. This often helps germination, and more in the magnolia than any other plant I know. If the magnolia is sown when gathered, there is an oil in the pulp that surrounds the seed, which, as soon as it begins to rot, seems to penetrate the seed and make it rancid. I have frequently noticed that of the seed of the magnolia, that was not washed clean, few germinated; the pulp, in rotting, so soured the soil that it became full of fungus, which damped off many of the young plants, necessitating their removal to fresh soil to save them; while of those washed and sown under the same circumstances all came up and grew well. Of course this may not occur in

nature, where the seed is exposed to the air and weather, or eaten by the birds and voided; but I am speaking of artificial cultivation. When magnolia seed is to be sown out of doors in New England it is best, after washing it out, to put it in pots or boxes of sand, — that is, in alternate layers of sand and seed, — and place it in a frame or cellar, where it does not freeze, until the time of sowing in May. This is a good way to keep seeds for which we may have no place prepared, or which may arrive in late fall or winter, when it is impossible to get them into the ground. Very often it is more convenient to put seeds away in this manner until spring, than to sow in the fall; but it will not answer for seeds which need frost.

When seeds are sown in the fall it is well, as soon as the ground is frozen, to cover the beds or rows with a light covering of hay, pine needles, or leaves; which will keep the ground from heaving, and the heavy spring rains from washing up the seeds. If closely looked after, the covering may be left on until the seed shows signs of germination, which, in the case of large nuts, will be in June, when it should be carefully removed; this will also save a great amount of weeding.

All seed beds and rows should be kept free from weeds and, except where sown broadcast, as soon as up the ground should be hoed or cultivated frequently; this causes the young plants to push with greater vigor, and makes them better able to withstand drought. If the weather becomes very warm and dry the beds or rows of young seedlings should be well watered once or twice a week, — not by a slight sprinkling on the surface, but by a good thorough soaking, wetting the ground six or eight inches in depth. After the 1st of September the waterings may be discontinued, to allow the plants to ripen up their growth.

At the approach of winter all young seedlings that were sown in drills will stand better if a plough is run between them throwing a furrow against the stems, so as to cover them several inches deep; this keeps the young plants from heaving with the frost, and also keeps the water and ice from settling around the young stems, which often causes great injury. Those sown broadcast should have a slight covering of hay or leaves, as soon as the ground is frozen, which is usually from the 25th of November to the 1st of December in this vicinity.

Second Year's Treatment. — About the first or second week in April the covering should be removed, the young trees carefully taken

up, and the tap roots cut well back; the cuts should be clean and smooth, so they will quickly callous and send forth plenty of young fibres, which would take some time if the cuts were not smooth. If any of the tops are crooked they should be cut back to a good strong eye; this will cause them to make a straight leader. When taking up the young trees, they should not be exposed to drying winds, or hot sun, even for a few minutes, but as soon as taken up they should be tied in bundles, and the roots well sprinkled with water, and covered with a mat, or piece of old bagging, and kept moist until they are planted. There is no doubt that a great many failures in tree planting could be traced to the drying up of the roots before planting, and it has often been a wonder to me how some trees grew at all, considering the treatment they received.

The Nursery. — Having a good piece of land well prepared, either by trenching or ploughing, mark out rows three feet apart with a spade or plough; if with a plough go twice in a furrow, which will usually make the drills deep enough for trees one year old, and, if they are to remain only one year, one foot apart will do for the larger growing kinds, and six inches for the smaller ones; if to remain a longer period a much greater distance will be required.

In transplanting trees the roots should be well spread and the soil worked well in about them, and well firmed with the feet. Our seasons for planting are often so short that we have to plant in all kinds of weather, though it is best not to plant when the ground is wet, if it can be avoided. The best time is when the soil is dry enough to crumble easily; it can then be worked among the finest roots, even if there are a great many of them, by taking hold of the tree and giving it three or four good shakes as the soil is being spread around the roots; but it is hard work to get it among the roots when it is wet and pasty. After planting, weeds should never be allowed to get a foothold in the nursery, but it should be cultivated at least once every two weeks, and all weeds cut out with a hoe between the plants. This will help the tree to withstand a long drought much better than it otherwise would, and at no great cost.

At the end of the second year almost all deciduous trees, if for forest planting, will be as large as it is profitable to plant in large quantities. If wanted for ornamental purposes they will need to be transplanted at least every two or three years, and carefully pruned

into proper shape until they have reached the desired size. If often transplanted they may be successfully removed when from fifteen to eighteen, or even twenty feet in height; though I believe that vigorous young trees, from one to three feet high, when set out where they are to remain, will make much finer specimens if soil, preparation, and care be equal.

The Conifers, such as Pine, Spruce, Larch, Cedar, and Hemlock require much more attention and care to grow from seed than any other class of trees, and many of the finest kinds it is impracticable to raise out of doors in our New England climate, though the common ones with care and attention may be raised quite successfully. The ground for these seeds should be a light, rich loam, deep and well pulverized, or, if not rich, made so with a good dressing of well-decomposed manure. The beds should be laid off five feet wide, and the alleys three feet. Along both sides of the beds, at intervals of five or six feet, drive a row of small posts that will rise six or eight inches above the surface of the beds. The beds should be a few inches higher than the paths, so that water will not stand on them. The situation should be as sheltered as possible both from the mid-day sun and drying winds; the north or east side of a hedge or fence is a favorable position. The beds being all prepared and raked very fine, as soon as the weather becomes settled — say from the 10th to the 20th of May — the seed may be sown thinly, in rows six inches apart, across the beds, or broadcast, and slightly covered, — certainly not more than twice their own diameter. The sowing in rows is most convenient in working them, both in the way of keeping the beds clean and stirring the soil among the young plants. If sown broadcast they should be lightly raked in and the bed rolled with a light wooden roller. I would here say that all seeds sown during warm, dry weather are much benefited by having the ground lightly rolled over them. The sowing being completed, place on the posts before mentioned lath screens made the width of the bed, with the laths not more than an inch apart. This will screen the plants from the sun and in part protect them from the birds, which often pick up the young seedlings that are just breaking ground. If no laths are handy the seed beds can be covered with pine, hemlock, or cedar branches, quite thickly at first; but the beds must be watched carefully, and as soon as the young plants begin to appear the branches should be gradually removed, until only enough are left to slightly shade the young plants, and these should be raised some inches above

the plants. It is a good plan where pine needles are plenty to cover the seed bed thinly between the rows with them; this keeps down the weeds, saves much watering, and keeps the soil from washing or baking. If the ground is very dry at the time of sowing they will require a slight watering; otherwise they will not need it. In my experience there are few seeds that require so little water as those of conifers during germination.

The critical time with young conifers is the first three months of their existence, until they have made the crown bud; after that time there is very little danger, but until then extreme watchfulness is very necessary; a great quantity of rain or a scorching sun will often prove fatal to thousands. Stirring the soil after heavy rains, and tilting the screens as soon as the sun is gone from them, or sifting dry soil amongst the beds of over-wet seedlings, is of great benefit. After the muggy weather of August is past they will require very little care the rest of the year. At the approach of cold weather they are best protected by a slight covering between the rows, and a few pine branches or a little meadow hay spread over the tops of the young plants will keep them in good condition until spring.

The Pines, such as the Scotch, Austrian, and Red, should not stand more than one year in the seed bed without transplanting, unless sown very thinly. The White, Black, and Norway Spruces will hardly be fit to transplant until the end of the second season. The Larch makes better plants if transplanted at one year, but will stand two if thinly sown. The Silver Fir, Balsam Fir, Hemlock, and others of that section may stand in the seed bed two years, while the Arbor Vitæ should be transplanted after the first season. The seeds of the Juniperus and Taxus, of all species, do not germinate until the second year, and it is well to treat them as I have recommended for all slow-growing seeds. The Ginkgo, if fresh, will come up the first year, though I have had them lying in the ground two years. The *Pinus Cembra* and otherStone Pines will lie in the ground until the second year, though a few may come up the first.

The seeds of the Conifers, with the exception of the Silver Firs, will, if kept in a cool, dry place, retain their germinating powers for a number of years, and even under adverse circumstances. A few years ago we had some branches of *Pinus contorta* sent us, which had the cones of six years upon them. Each cone was opened separately and the seed carefully sown and labelled, and a

portion of all but one grew, and that one was only two years old, while the oldest represented the seventh year. White, Scotch, Austrian, and Pitch Pine seeds came up fairly after being kept five years, and might possibly have been several years old when received. I have found in my experience that too much moisture is fatal to the germination of old seeds, especially resinous or oily ones. If sown in soil that is barely moist, and covered with dry sphagnum, so as to prevent the escape of the little moisture in the soil, many will grow; while if treated in the ordinary way the seed will swell and then rot.

A friend of mine, who does not like too much care, has a very simple way of raising annually several thousand seedlings of the Norway Spruce, and no doubt other evergreens might be grown under similar conditions. At the back of his house he has a white pine grove, which is trimmed up ten or fifteen feet; the soil is a light, sandy loam. In this he digs several beds, rakes them fine, and early in May sows the seed, rakes it in lightly, and sprinkles the bed lightly with pine needles. If the weather is very dry he gives the bed one or two waterings; if not dry, he lets it in a great measure take care of itself. In these beds the seedlings remain two years, when he transplants them into nursery beds, where they soon make nice young plants.

The Box System. — The remarks that I have made would apply to those who wish to raise trees in large quantities, and where the loss of a few hundreds in transplanting would be of no material account. To those who might wish to plant an acre or so every year, and want no failures, I would recommend another system, which requires less space and labor, though possibly more attention, but in the end any one could transplant the most difficult trees, such as oak, hickory, or chestnut, with no loss. For want of a better name I have called it the "box system." No doubt it has often been used, but I have not heard of any one using it largely except myself. By this method every root is preserved, and not even a fibre destroyed; there are few if any large tap roots to cut off, and even if grown in the nursery afterwards they lift with finer roots than the seedlings grown in the ordinary way; and though they will not make so vigorous a growth the first year as they would in the open seed bed, at the end of the second year after transplanting they are ahead of those of the same age grown in the ordinary way; and with no failures. Nine years ago we transplanted from the seed boxes to a hill-side, in sod ground with

no preparation except to turn over the sod with a spade where each tree was to go, some hundreds of oaks one year old, and today they are fine young trees, from six to nine feet high, well formed, and much more vigorous than those grown in the nursery, which have had a great amount of care and labor bestowed upon them. I believe that if many of our early planters had used this system in growing oaks, hickories, and other hard wood trees, they would not have had so many failures to complain of.

In the first place procure a lot of common boxes, such as may be had at any grocery store; any kind of boxes will do, though a uniform size is best, as they occupy less space in a six-foot frame, when packed away, than boxes of various sizes would. I usually get those that have contained canned goods, or soap, as they are nearly equal in size, and with two cuts of a splitting-saw you have from each box three flats, from three to four inches deep, which is a good depth for any ordinary seed. With a half-inch auger bore three or four holes in the bottom of each box for drainage. This will be sufficient for large-rooted plants, while the finer seeds will require to be well drained with broken pots, coarse siftings of peat, or any coarse material that will allow the moisture to pass off readily. As soon as the seeds are ripe, in the fall, get together a good pile of compost, made as follows: two parts rotten sod, one part peat, and one of sand, and if the seeds to be sown are oak, hickory, beech, chestnut, or walnut, add a portion of good rotten manure. For such seeds as I have mentioned fill your boxes two-thirds full of the compost, and press down firmly with a board or the hand. Sow the seeds evenly and press them down in the soil, covering them from half an inch to an inch in depth, according to their size. On one corner of each box smooth off a place with a plane or knife, rub over with white lead, and write the name of the seed and the date of sowing. This takes only a few minutes, and is of much value afterwards, especially where a great variety of seeds is sown. It is much better than labelling in the ordinary way, and there is no danger of the record being lost in moving the boxes from one position to another. The finest seeds — such as maples, elms, birches, alders, and others — should be covered, according to the size of the seeds, about their own diameter. After sowing, the seeds should have a good watering with a fine rose, to settle the soil. The boxes can then be piled four or five deep in a pit, the sashes placed in it, and at the approach of cold weather they

may be covered with meadow hay, or leaves. This does not keep the boxes from freezing, but when once frozen it keeps them so until spring. If no pit is available the boxes can be piled six or seven deep in a well-sheltered spot, covering the upper boxes with a few boards, the whole to be covered with leaves or other litter. In the case of all the seeds I have mentioned as taking one or more years to germinate it is unnecessary to cover the boxes with litter; but it is well to cover with boards, so that mice or squirrels may not get at the seed; and in many cases seed that has been so frozen will often come up the first season, which otherwise would not have come until the second. As soon as the weather is settled, which is usually about the middle of April, choose a well sheltered spot, level, and handy to water. If the aspect can be an eastern or south-eastern one I like it better, as they get the early morning sun, but not the scorching sun at noonday. Place all the boxes containing the nuts, acorns, and other large seeds together, in beds of three boxes wide. This will make it very compact, and much easier to care for them than if the boxes containing seeds of the same class are scattered about. The only attention these will require is to keep them well watered and free from weeds; but for such seeds as maple, ash, Carpinus, Cratægus, elm, Cladrastis, and others of like nature, it would be well to cover the boxes with lath screens until they have made the second or third rough leaf, when they might be gradually hardened off and finally exposed fully to air and light. If a few sashes could be spread to protect all delicate growing seeds it would be of great advantage, and as soon as well up they could be treated the same as the others.

The use of lath screens on seed beds saves a great amount of labor in watering, and if the plants are neglected for an hour or so the results are not so disastrous as when the young seedlings are fully exposed to the sun. Any boxes of seeds that do not come up before the last of June will hardly appear that year, but will require to be kept moist, the same as the growing plants. I usually place all such boxes together in a shady spot and cover them to the depth of an inch or more with sphagnum, and by giving them a good watering once or twice a week they are carried safely through the summer. At the approach of cold weather they are gathered together, piled five or six deep as before, and covered for the winter. When spring comes on they will need to be treated as seed that has just been sown. For the finer seeds,

such as azalea, rhododendron, kalmia, and others, a special treatment is required, which I will speak of later.

In the fall of the first year the boxes of young trees may be gathered together and wintered in a deep pit or frame and slightly covered with meadow hay. If no frame is available, three or four inches of pine needles or leaves may be placed over the boxes, and they may then be left until spring; but on no account should the boxes be left without any protection, as the young seedlings will then suffer very much in so little depth of soil.

All seedling trees can be transplanted when very young as easily as cabbages or tomatoes if taken as good care of; and many of them are benefited by the operation. We transplant thousands of them every year with but little loss. The best time is when they are making their first or second rough leaf.

In the spring of the second year all the young seedlings should be transplanted from the seed boxes to the nursery beds, or the larger ones planted where they are to remain; and for chestnuts, hickories, and oaks I believe it is best to plant them from the seed box to the field where they are to remain. If planted in nursery beds, or rows, the treatment will be the same as I have spoken of under the head of treatment in nurseries.

The boxes I have mentioned are usually from fourteen to sixteen inches square, and will hold from 100 to 125 oaks, hickories, chestnuts, or beeches; 175 to 200 ashes or maples; 250 birches or elms; and so on according to the growth of the plants. Where a greenhouse can be used for this purpose, with frames to harden off the young seedlings, much better results can be obtained, and many of the finer seeds can be grown, which it is next to impossible to grow in large quantities out of doors.

In conclusion I would say that, while I have not mentioned every tree by itself, the general principles are the same for all; that as a rule the soil should be of the best description and sheltered; that all seeds should be covered only a little, if any, deeper than the diameter of the seed; that they should be kept clean from weeds, the watering well looked to, and the shading, in the case of the finer seeds, be carefully attended to. They should be protected the first season, and in the end will well repay all the care and attention that have been bestowed upon them; and any one owning a few acres of land, who will plant a few boxes of chestnuts, black walnuts, beech, oak, hickory, or other hard wood trees, that are usually considered so difficult to transplant, after growing them one year in the

boxes and transplanting the following spring where they are to remain, will be astonished to see how much land can be covered in a few years with healthy young growths of hard wood with very little trouble or expense. And in New England, as well as in other parts of our country, we have too many acres lying idle, which it would be more profitable to plant with trees than anything else.

Rhododendrons, Azaleas, and Kalmias. — The propagation of these from seed demands great attention and care, and cannot be successfully done out of doors, but requires a greenhouse. The best soil to grow young seedlings of this class is composed of good peat, loam, and sand, in equal parts. The sand should be fine, but sharp and clean, having no clay or iron in it. Earthen pans are best to sow the seed in, as there is less danger of fungus than with boxes; but after the first transplanting boxes may be used. Being all ready to sow, — say about the first week in January, — the pans should be well drained by filling them one-third with broken crocks, over which put a covering of sphagnum, or the coarse siftings of peat, so that the soil will not work in among the drainage; then put in about two inches of the compost mentioned above, have it well firmed, and give the pans a gentle watering with a fine rose to settle the soil. As soon as settled the seed can be sown quite thickly, but evenly, over the surface. They should then be covered with the slightest possible covering, — not more than the sixteenth of an inch, — after which put over the pans a covering of fine sphagnum, give a gentle syringing, and place in a temperature of seventy degrees. After sowing, the seed should on no account be allowed to get dry; but at the same time saturation should be avoided. The seed will usually come up in from two to three weeks, and in the meantime the pans will have to be examined occasionally to see if the seed is coming. As soon as it shows signs of germinating the coarsest of the moss should be gradually removed, and when the seed is fairly up a slight sifting of fresh soil among the young seedlings will help to strengthen them. As soon as they have made the first rough leaf they should be pricked off thickly in boxes or pans of fresh soil prepared as for the seed, carefully syringed, and kept growing in a high temperature and moist atmosphere. Such delicate seedlings as rhododendrons at this stage should never be transplanted in a shed or room where there is any draught, but always in the close, moist atmosphere they are grown in, as the

roots are so delicate that only a moment's drying makes them almost worthless. After five or six weeks the plants will have covered the surface of the ground in the boxes, when they will again need transplanting, this time half an inch apart, and to be otherwise treated the same as before, always being sure to use fresh soil and clean boxes at each transplanting. At this stage, if everything has been carefully attended to, they will grow very rapidly, and will need transplanting the third time, and, if properly cared for, they will need to be planted two inches or more apart.

This frequent transplanting in fresh soil each time keeps the plants from damping and also forms the foundation of a vigorous plant for the future. If rhododendron seedlings are left long in the seed box or pan they are apt to be attacked by a minute fungus, which will often carry off thousands in a night. The best remedy I have found to check it is, at the first signs of its appearance, to heat a shovelful of sand quite hot and sift it amongst the young seedlings, using a very fine sieve. Many would think that it would destroy the plants at this tender age, but it does not; I have tried it on almost all kinds of young seedlings, and have found it very effective in destroying the minute fungus which is such a pest among young plants. About the first of September more air and less moisture may be given, so as to harden the plants off preparatory to their removal to winter quarters, which should be a deep frame or pit in some sheltered situation. They may be put in this pit the first of October; or sooner, if you need the house for other purposes. In this pit they should have plenty of air every pleasant day, but should be covered every night to keep them from frost as long as possible. This can readily be done in most seasons up to the middle of December or the first of January by a single mat; they can then be covered with mats, or meadow hay, and will only need to be uncovered once every two weeks for an hour or so to guard against damp or excessive moisture, which will often cause a fungus even in a cold pit if kept long without air. In the spring, about the first of May, they can be transplanted into well-prepared beds of peaty soil or a light, sandy loam of good depth. If dry weather sets in they will require plenty of water, as they are not deep-rooted at this time; if water is handy I give them a good syringing every evening as soon as the sun begins to leave the bed, until the middle of August, when I withhold all moisture so that the plants may ripen well before winter sets in. If they have been well cared for they

will be from six to seven inches high at the end of the second season.

At the approach of cold weather a slight covering of leaves between the young plants, and covering the tops with pine boughs, or coarse meadow hay, to keep the sun off, will carry the plants through the winter in safety. The following spring they may be planted in the nursery, where they can remain until used. The same treatment will apply to Azaleas, Kalmias, and other Ericaceous plants, only the Azaleas grow much more rapidly than the others, and at the end of the second season such species as *mollis* and *calendulacea* will have quite a number of flower-buds on them, while the Rhododendrons will scarcely show signs of flowering until the fourth or fifth year.

Discussion.

J. H. Bowditch was much pleased with the practical character of the essay, but did not agree with Mr. Dawson in regard to the use of boxes by the average cultivator, who, the speaker thought, would prefer to plant the seed where the tree was to remain.

Mr. Dawson said that it would be advisable for amateurs to try the box plan; it would be easier than any other way, especially for deciduous trees. There is no loss whatever in transplanting from the boxes, while from the nursery a large percentage is lost.

Mr. Bowditch thought most farmers would rather open a furrow with a plough, and drop half-a-dozen nuts or acorns where they want trees, and then cover with the plough. The work would be done at once, and in the easiest possible way.

O. B. Hadwen thought Mr. Dawson's paper exceedingly practical. He has not himself given much time to planting forest trees, but has had trees from Mr. Dawson which, though very small when planted, have done well. Planting trees should be encouraged, both for practical use and for ornament. He finds the seeds of all the trees in his grounds, that are large enough to produce seed, springing up around them; and has seedlings of Nature's planting, of hickories, black walnut, several species of maples, English, Scotch, and American elms, tulip tree, several magnolias, including *Soulangeana*, pine, larch, and Norway spruce.

William C. Strong thought Mr. Dawson's paper so complete, and his rules so simple, that no one could err in following his directions. It would be a very valuable guide to young nurserymen.

He doubted, however, whether growing young seedlings would be very profitable here; they are raised very cheaply in Europe and the West, and are not in demand here. The essayist calls his method simple, but it appears difficult, as if more was required than Nature requires, yet it is not so. Nature sows the seed in the fall, covers it with leaves, and it is frozen and thawed. Nature provides lavishly of seed, and can afford to do so, for a single tree will sometimes produce millions of seeds.

The essayist had given directions how to induce seeds to vegetate the first season. The speaker, after subjecting seeds to the action of frost, had put them in a gentle hot-bed, treading the manure down well; and this not only induced many to vegetate which would not otherwise have done so, but caused a prodigious growth,— double and quadruple the size of the seedlings imported. This method induces the roots to strike down. He had witnessed Mr. Dawson's method of sowing in boxes, and he gets admirable results for his purpose, which is largely to raise stocks for grafting; it is *the* way for that. The speaker agreed with Mr. Bowditch, that planting out-doors, where the trees are to remain, is the most economical way. Mr. Dawson is very successful, but it is because it *is* Mr. Dawson who watches over the work. But Nature is a good school-master as well as Mr. Dawson. The speaker could not understand why Nature has placed oily matter around magnolia seeds, which it is necessary to wash away, but he never saw a magnolia seed vegetate with the pulp around it.

Mr. Bowditch remarked that it is very important to plant oak, beech, and chestnut seeds when fresh, and not allow them to become dry.

Col. Henry W. Wilson had been much interested in Mr. Dawson's paper, which he thought well adapted to the wants of members of the Society who desired to grow a few trees and be sure of having them genuine. Mr. Dawson's method is best; it gives the conditions of Nature. Those who grow seedlings in large quantities are often negligent, and their stock cannot always be relied on. He had been disappointed, after planting and tending trees two or three years, to find that they were not what he bought them for. *Magnolia conspicua* turned out to be *M. acuminata.* The walnut and chestnut vary greatly in size and quality, and he hoped that at some time Mr. Dawson would tell us how to have them of large size and fine quality, and the walnuts with thin shells. He would

also like to know how to graft hickories; a friend of his had succeeded once and failed forty times.

Mr. Dawson suggested that there might not have been any fraud in regard to Col. Wilson's magnolias; the *conspicua* may have been grafted on the *acuminata* and the graft broken off.

President Moore said that the paper which had been read was very interesting to him. It shows the reasons for failure in raising seedlings. It gave him great satisfaction to raise anything from seed himself, whether it paid in dollars and cents or not, and he liked to know how to do it.

Aaron D. Capen wanted people to cultivate a taste for trees, and to plant rough, rocky pastures with them. This can easily be done in autumn by taking a small iron bar and making a hole about two inches deep, and dropping in a chestnut, hickory nut, or acorn. He had seen quite a grove of chestnuts planted in this way. If a gentleman in middle life will do this he will wake up some morning astonished at the results. It can easily be done in the course of a pleasant ramble; if you take fifty nuts in your pocket twenty of them will grow, and Nature will take care of them. If you want trees for timber plant them rather thickly, but if you want them for ornament or for the nuts they should have room to spread thirty feet or more. The speaker had sent choice hickory nuts of his own raising to a friend in Georgia. Trees with only tap roots are more apt to blow over than those with spreading roots.

Mr. Dawson said, in answer to an inquiry as to the best time to plant apple and pear seed, that it must either be planted in the fall, or washed out of the pomace and packed in sand and placed in a cellar. It may be sown with a drill in the spring. If not put in sand, but allowed to get dry, only part will come up the first year. He had seen the seeds of apples and peaches planted of which none came up until the second year.

President Moore said that he had kept apple seed in boxes in sand successfully until spring.

The Committee on Discussion announced for the next Saturday a paper by Hon. Marshall P. Wilder, on the "Nomenclature of Fruits," after the reading of which Hon. James J. H. Gregory would speak of "Nitrogen in Agriculture."

BUSINESS MEETING.

SATURDAY, March 14, 1885.

An adjourned meeting of the Society was holden at 11 o'clock, the President, JOHN B. MOORE, in the chair.

The Secretary read a letter from Mrs. Martha F. Winship, acknowledging the receipt of the resolutions passed by the Society in memory of her husband, the late Francis Lyman Winship, with the thanks of herself and her children therefor.

Adjourned to Saturday, March 21.

MEETING FOR DISCUSSION.

The following paper was read by the Secretary: —

THE NOMENCLATURE OF FRUITS.

By HON. MARSHALL P. WILDER, Dorchester.

Mr. President: — I deeply regret that my health will not permit me to be present and take part in the discussions of today. The subject of this paper has claimed my attention for many years; and as president of the first great leading pomological society in the world I felt it my duty, in conjunction with a special committee of that society, to incorporate in my last address my views on the importance of the subject. These have been communicated to the principal horticultural and pomological societies of our own and other lands, and have been accepted and approved of as a necessary reform in the nomenclature of fruits. The Massachusetts Horticultural Society has joined most heartily in this reform, and I hope will continue to progress in it.

It is surprising that this work has not been entered upon before. By some it has been considered as too aggressive; but all reforms are necessarily aggressive, and, as shown by experience, must be gradual in their progress. All agree, however, that long, superfluous, inappropriate, indelicate, ostentatious, and unmeaning titles should no more be applied to our fruits. We may not be able to correct all the errors of the past, but we may prevent the repetition of them in the future. Hundreds of varieties once known in our catalogues have become obsolete for want of good proper-

ties, and so it will be in the future; and we shall retain only such as, by their excellence and adaptation to our situation and wants, are worthy of extensive cultivation. Like the Baldwin apple, the Bartlett pear, the Concord grape, and other renowned fruits, let such varieties be dedicated to perpetual remembrance by appropriate names, so that we may hand down to future generations a system of nomenclature, pure and plain in its diction, pertinent and proper in its application, and which shall be an example, not only for fruits, but for other products of the earth.

Let us have no more Generals, Colonels, or Captains attached to the names of our fruits; let us have no more Presidents, Governors, or titled dignitaries; no more Monarchs, Kings, or Princes; no more Mammoths or Tom Thumbs; no more Nonsuches, Seek-no-furthers, Ne Plus Ultras, Hog-pens, Sheep-noses, Big Bobs, Iron Clads, Legal Tenders, Sucker States, or Stump-the-Worlds. Let us have no long, unpronounceable, irrelevant, high-flown, bombastic names to our fruits, and, if possible, let us dispense with the now confused terms of Pearmain, Pippin, Belle, Beurre, Calebasse, Doyenne, Seedling, Beauty, Favorite, and other like useless or improper titles to our fruits. The cases are very few where a single word will not form a better name for a fruit than two or more. Thus shall we establish a standard worthy of imitation by other nations, and I suggest that we ask the coöperation of all pomological and horticultural societies in this and foreign countries, in carrying out this important reform. These are the suggestions which I have before made, and which have been extensively adopted by the pomological world, and I see no reason for retracting anything I have said on this subject. This reform cannot be accomplished at once; but it has the merit of putting a stop to the improper dedication of some of the most beautiful works of nature with improper, ostentatious, irrelevant, and useless terms.

In my address to the American Pomological Society I have spoken of the importance of the establishment of short, plain, and proper rules to govern the nomenclature and description of our fruits, and our duty in regard to it; and I desire once more to urge upon this Society the importance of aiding in this good work. The American Pomological Society has taken up the work in earnest, and soon, in conjunction with this and other societies, we shall have a reform worthy of its position, age, and character. I see no reason why the principle should not be carried further than has yet been done in the Catalogue of the Pomological

Society, as, for instance, by the substitution of Lucrative for Belle Lucrative, and Nelis for Winter Nelis. Pomologists may differ as to how far it should be carried, but by comparison of views we shall come to a final agreement, and the reform, we confidently believe, will at least save us from objectionable names in the future.

Discussion.

Robert Manning said that the agitation of the subject before the Society was begun nearly forty years ago, when "Rules of Pomology" were adopted by this Society and other horticultural societies. In 1867 similar rules were adopted by the American Pomological Society. The improvement proposed by Mr. Wilder was adopted by Professor Decaisne, of the Jardin des Plantes, in his magnificent work, the "Jardin Fruitier du Muséum," commenced in 1858, but to Mr. Wilder belongs the credit of first making it practical in American pomology. Some eminent pomologists have advocated retaining well-established names, such as Rhode Island Greening, even though long, when like that they are well established and easily pronounced; and perhaps it will be found best to retain familiar names, even if so long that they would not now be applied. The principle advocated by Mr. Wilder has been applied to the nomenclature of vegetables in the publications of the Society, the Clark's No. 1, Beauty of Hebron, and Early Rose potatoes becoming Clark, Hebron, and Rose, and the speaker suggested that it be applied also to the names of garden flowers and ornamental plants, thus avoiding such names as *Ilex Aquifolium parvifolia conspicua argenteo-marginata;* or, not to take so extreme an instance, Waterer's Holly is infinitely preferable to *Ilex Aquifolium* var. *Watereri.* On this point he commended to the attention of those interested a little tract by Dr. Masters, editor of the "London Gardeners' Chronicle," on the "Nomenclature of Garden Plants."

E. W. Wood expressed his regret that Mr. Wilder could not be present to speak of the subject under discussion, which is one of great interest to him as well as to all fruit growers. All we can do is to follow out the suggestions which he has made. It is not only important that fruits should be called by simple, sensible names, but that each should have one standard name, such as the American Pomological Society has endeavored to establish. The Baldwin apple, or Woodpecker as it was originally called, has

been known by seven different names, and the Nickajack apple — a variety widely cultivated in the Southern States — has, according to Downing, no less than thirty-six synonyms.

David W. Lothrop said that his attention was drawn to the subject by reading Mr. Wilder's address as President of the American Pomological Society, and he was a little surprised to find him so severe in the pruning of names. Names, perhaps, may well be divided into three classes: first, descriptive names, such as Moore's Early, Seaver Sweet, Hunt Russet, Roxbury Russet, or Red Astrachan; and, in the judgment of the speaker, it would be well to retain such names though they might be composed of more than one word. Second, names given in honor of the originator or disseminator of a fruit, like Baldwin or Bartlett; or the towns in which they were natives, as Concord Grape and Hubbardston Nonsuch. The third class comprises such names as embrace honorary titles, as Captain, General, President, Bishop, etc., or those that are vulgar, coarse, or uncouth. To all of this class the speaker objected, the former being too common, the latter degrading. Mr. Meehan, the editor of the "Gardener's Monthly," says that Washington is a better name for a pear than President Washington would be. In regard to foreign names the speaker thought we can hardly claim the right to change them, though many of those of French roses are very long and repellent. Even in our own country, societies have but little control over the names of fruits and flowers.

William C. Strong said that the majority of horticulturists are poor French scholars and pronouncers, and they find such names as Étoile de Lyon and those of many other French roses extremely difficult to write or speak. He moved that a committee be appointed to consider the subject of a reform in the nomenclature of garden plants. The motion was carried, and the chair appointed Mr. Strong, E. W. Wood, Edward L. Beard, and Robert Manning as that Committee.

The discussion of Nomenclature ceased here, and the Chairman of the Committee on Discussion announced the following paper, which was read by the author: —

Nitrogen in Agriculture.

By Hon. James J. H. Gregory, Marblehead.

What is nitrogen? The air mass surrounding the earth to a depth of nearly fifty miles is composed of about four-fifths nitrogen in combination with one-fifth oxygen gas. There are always right at hand unnumbered thousands of tons of nitrogen. But this vast store of potential wealth is unfortunately never available to the agriculturist. His chemistry has never yet mastered the problem of drawing upon atmospheric nitrogen for plant food.

He has to depend for his supply wholly on that which has been incorporated into the structures of plants or animals. His sole resource consists in the wastes of these organic structures; in the form of excrements, or of dead remains, either from land or sea. The ammoniated liquor from the gas works is waste produced from the remains of ancient forests now consumed as coal.

The same is true of animal life as of plant life. While over three-fourths of the air we breathe is nitrogen, and while it enters so largely into the composition of our bodies, it appears totally inert in respiration, and enters the system solely through the organs of nutrition and in the form of vegetable or animal substances used as foods. As the product of animal decay, in drinking-water it is sometimes prejudicial to health, causing dangerous fevers.

Combined with hydrogen, in the proportion of 82 parts to 18 of the latter, it becomes ammonia; one of the most common forms in which, from the waste of both animals and plants, nitrogen is fed to our crops. It is well to fix in the mind that in changing nitrogen to ammonia, in any manure analysis, we must add about one-fifth to the quantity given. The other most important form of nitrogen is nitric acid. This is a combination of nitrogen with oxygen; and nitrates, of which we see frequent mention in all works on manures, are a combination of nitric acid with soda, potash, and other materials, which are called bases.

It appears to be a settled conviction among men of science, as a result of many experiments, that plants cannot take up pure nitrogen directly from the air. The theory is that they are able, to a greater or less degree, to get their supply through the water that carries it in some form in solution into the soil; and also, indirectly, from the air which permeates the soil and under its influences yields up its nitrogen. Also there is nitrogen latent in the soil,

having been accumulated there, that can be set free, to serve as plant food, by the action of certain substances, such as lime and plaster.

There is a general belief among agriculturists that plants have ways of collecting nitrogen still but little known. Some extremists have gone so far as to deny any necessity for feeding nitrogen to our crops, asserting that these can of themselves collect from natural sources all they require. There is a growing belief that their power to supply themselves from natural sources is greater than they have hitherto been credited with.

It has been observed, moreover, that different kinds of plants have different capacities for taking up nitrogen. Clover is an example; for, though nitrogen enters largely into its composition, it has such a capacity to help itself to the good things that surround it that it needs very little artificial help; while wheat, though it needs but little nitrogen, is so dainty a feeder that it insists on a large artificial supply from which to pick out that little.

Where Nitrogen or Ammonia Comes From. Waste of the Fisheries.—One of the principal sources from which manufacturers of fertilizers obtain their ammonia is the fish-waste or offal which they pick up all along the coast from Maine to Florida. The chief part of this waste is from the fish known by various names in different localities, as "manhaden," "heart-heads," "moss-bunkers," and in the South as "fat-backs." These are caught in nets and boiled to secure the oil, in which they are rich, at various establishments along the coast and its bordering islands. After boiling, the water and oil are pressed out of the mass, and the residue is sometimes thrown into heaps to heat and dry; at other times it is put directly into barrels and pressed in. In this condition it is known as "pomace," or "chum." If it is to be sold as fish-guano it is spread on large platforms to dry, after which it is ground. Fish-guano is sometimes treated with acid, but whether this is done or not it is a valuable fertilizer.

As a general rule three barrels of fish before cooking make one barrel of the chum. The fertilizer manufacturer dries and grinds it, using it crude, or treating it with acid, to make the nitrogen and phosphoric acid directly available for plant food. Sometimes, when the catch is a large one (over two hundred thousand fishes are at times taken in a single haul of the net — enough to load two or three vessels of fifty tons each), and the quantity of fish is greater than the oil factories can take care of in hot weather, the

surplus is sold to the neighboring farmers at the best price that can be got.

Besides the manhaden there are numerous other fish-wastes, all rich in nitrogen and phosphate. On two occasions I have purchased cargoes of spoiled herring; in one instance nine hundred barrels, at the rate of fifty or sixty cents a barrel, which, as a barrel weighs about two hundred pounds, would be about five dollars per ton. In some instances the fish are preserved in salt, which adds one-quarter or more to the weight; in others they are fresh, with the oil in them, which does not add to their value as manure, for oil is nearly pure carbon, which is of no value for the purpose; on the contrary, it somewhat hinders their decomposition.

Occasionally, during the fall fishing, on the fishing-banks near the coast, a supply of pollock will accumulate, more than the market will take; when they can be purchased at a price that will make cheap manure. A few years ago, to help sustain the market, I left a standing order with our fishermen that I would pay twenty-five cents a hundred pounds for pollock; the result was twenty thousand pounds of fine large fish, weighing from eight to fifteen pounds each, just out of the water, hauled to my manure heap.

Not long ago vast quantities of waste were made in the heads, sound-bones, and entrails, which accumulate at fishing ports. These were for years dropped into the ocean as refuse. So immense was the waste, that at the Isles of Shoals, off the New Hampshire coast, the harbor actually became so nearly closed to navigation that the inhabitants, on two occasions, had to dredge it out. I am told that beneath some of the long wharves of Gloucester, Mass., the great fishing town of the United States, there has accumulated an almost immeasurable quantity of this bone refuse. When, a few years ago, the heads, sound-bones, and entrails became a market article, I used to buy it at $5 or $6 a cord on board the cars; a cord weighs from three and a half to four tons. It was an exceedingly cheap manure, but a very disagreeable one to handle, the smell being anything but ottar of roses; while it took a vast quantity of soil to compost it. After remaining some months, oftentimes the heads would not be fully decayed, making the mass extremely disagreeable to handle, while there could only be a rough guess made as to how much of it would become plant food the same season it was applied. Of late years the fish are for the most part cleaned before the vessels reach port,

and the waste is thrown overboard. At places along the coast, where bay-fishing is conducted on a large scale, there can be sometimes found a liver or blubber chum, it being the refuse after oil is extracted from fish-liver. If a year old it loses moisture, and consequently weight; and is therefore richer. This liver chum is a pasty, sticky substance, generally sold at a figure considerably below its value by analysis. I have bought it as low as $4.50 per ton the present season (1885); and it is rarely higher than $12, although by analysis it is worth $18.83 per ton. I would advise cutting liver refuse with sharp sand, to make it fairly fine.

Halibut chum is the refuse from the heads of halibut, which are cooked under high pressure, to extract the oil that exists in the bones. The result is to leave the bones in such a state that they can easily be crumbled. Naturally this is especially rich in phosphoric acid. It analyzes worth $19.99 per ton, and is sold at from $6 to $10.

This chum is usually engaged beforehand by dealers in fertilizers; but a wide-awake man, by looking around, can generally pick up a supply.

The waste of herring and mackerel at the fishing towns is sometimes made up into chum, being first boiled, to secure whatever oil they contain. These usually contain more or less of salt, having sometimes as high as twenty per cent, which makes them about as salt as kainite; and, like the potash-bearing mineral, they therefore need to be used with some care, lest the proportion of salt present should injure the roots of growing plants.

There is another waste of the fisheries which has come into the market of late years; I refer to the skins, bones, and fins of salted fish. These come from the fish that are stripped and sold, boxed, free of bones. It is a heavy article, and the strips come a little tangled. Fertilizer manufacturers usually monopolize this, though it can sometimes be picked up at Gloucester at from $3.75 to $15 per ton.

Dog-fish are a small species of shark, weighing from three to five pounds each, which, in the summer season, swarm along the New England coast on the inner fishing-banks, driving away most other fish. They are very easily caught, and, their muscles being very firm, are rich as manure. The great trouble in manipulating these has been due to the flesh being of such a sticky, oily nature that acid will not readily act upon it. Still, they are used very largely as a source for ammonia by one large fertilizer manufacturer in the

vicinity of Boston, who composts them with horse manure, and, I infer, lets his compost heaps remain two years before using, when the objection disappears. Being so abundant along the coast, and so cheap, costing, at wholesale, but a dollar a hundred fish, they are well worthy the attention of farmers who live along the shore; for, though it might be necessary to keep them over a year, the investment would pay an interest of some hundred per cent. The fishermen in many localities would catch them if there were a market for them. The oil from the livers averages about a cent each fish; and with one cent from the livers and another from the fish itself, quite a fair business can be done during the hot months.

Waste salt that has been once used on fish contains in it some fish-waste, such as blood, and particles of the flesh and scales of the fish; for this reason it has some value as manure, in addition to its action on crops as salt. The fish scales analyze in the vicinity of 16 per cent in ammonia, and 40 per cent in phosphate of lime; they decompose more slowly than the flesh of the fish.

Fish manure, having the same origin as Peruvian guano, has the same constituents; but not in the same proportions, for ages of decay have reduced the guano greatly in bulk, and in the same proportion have concentrated it. All forms of chum have a large proportion of water in their composition. The fish heads and backbones have as high as 66 per cent. The chum pressed by a hand press has about 50 per cent, and that from a hydraulic press about 40 per cent. The average of the whole fish, as taken from the water, is about 80 per cent. The fish-guano, made from dried fish-waste, contains, on an average, 7.8 per cent of nitrogen. In making fish-guano the waste is dried in the sun, or by waste steam, and when sufficiently dry is ground, and sold at about $33 per ton.

The shells of lobsters, of which vast quantities accumulate at canning factories, are ground up and sold as plant food. They are a complete manure, and especially rich in nitrogen; analyzing, nitrogen, 6.2, potash, 0.2, phosphoric acid, 2.3 per cent.

How to Handle Fish-Waste, and the Best Way to Feed it to the Crops. — All fish-waste used in a very crude state is very stimulating, as might be inferred from its composition, and, being purchased at a low figure, is often used by farmers with a very liberal hand. As a consequence their crops are sometimes "burned up," as the phrase is. They are apt to infer that, if they

cannot see the fish in any part of the soil of the compost heap as they pitch it over, such soil can have no richness.

Now, one of the wonderful properties of dry soil is the avidity with which it takes ammonia to itself; and it may always be safely inferred that, in a well-mixed compost heap of fish-waste, the ammonia has diffused itself through every portion, and, all being assumed to be rich plant food, it should be used accordingly. Owing to the great richness of manure made from fish in bulk it is wiser, even after composting it, to use it broadcast, rather than in the hill.

Fish chum or pomace, may be used either broadcast and harrowed in, or by first composting with poor manure, to enrich the latter. If, after being broken up fine, it is put in thin layers with the manure, it will help the development of heat, which will tend to fine it up, so that it will combine with the mass when it is pitched over. A third way is to compost it with soil, waste turf, muck, or sawdust. In whatever way composted it is always good farming to take careful note of how many barrels go into the heap, so that we may know how much of potash, ammonia, and phosphoric acid we are applying to any given crop, and govern ourselves accordingly. There are two mistakes made in applying too heavily to one in applying too sparingly.

It is surprising how penetrating is the ammonia in fish-compost. For this reason, in making a heap, the bottom layer of soil should be a foot or more in thickness. I have seen cases where, the fish being used liberally, the soil was full of ammonia for several feet below the surface. In making the compost heap, after spreading the bottom layer, which should be thicker when whole fish, or the coarser waste, is to be used, cover with waste sufficient to just hide the soil; then cover with sod or soil about six times the depth of the fish, and thus proceed, scattering raw ground plaster over each layer of fish before covering with soil, at the rate of fifty pounds of plaster to five hundred weight of fish. The chemical changes which take place through the agency of the plaster produce sulphate of ammonia and carbonate of lime. After the pile has been built to four or five feet in height, surround the entire heap (it should be on level ground) with a little embankment of fine soil. This will catch the liquid that often runs from it when the fish begins to decompose, as well as catch what may be soaked from it by heavy rains; while it will also be handy for filling up the holes

that are apt to show themselves in the top as decomposition progresses, letting out bad odors unless promptly closed.

As the presence of oil or salt tends to check decomposition, fish-waste containing much of these had better be composted with stable manure rather than soil, as the heat from the manure will promote decomposition. If decomposition is slow to start, unleached ashes, or lime and plaster, may be mixed with the mass; but be sure to cover such heaps with soil. When manure is not used, the compost heaps should be made, if possible, before warm weather closes; and, after it has lain a couple of weeks, should no heat be found by driving a bar down, and testing it, then pitch it over to let the air in, and cover the outside lightly with soil. Stable manure which has heated and become "fire-fanged," thereby losing its nitrogen, can sometimes be bought at half price, and the nitrogen can be restored by composting it with fish.

Where chum is used, after having been made fine it can be applied directly to the surface of tillage land in the fall, and harrowed in or ploughed lightly under, to be thrown up near the surface by a deeper ploughing in the spring. If left on the surface I find it is spreading a table all winter long for the crows of the country.

By applying the chum in the fall it will have the advantage of rain and frost aiding to subdivide and dissolve it. Fish-skins, for use on tillage land, had better first be composted. If to be used on sward land for grass, spread thin in the fall or very early spring.

How much Fish-Waste should be used to the Acre? — To determine this we must consider two points: First, what proportion of it will make digestible plant food the first season; and, secondly, what and how much of the phosphoric acid and ammonia found in them do the crops we propose to raise require? I think we can assume, as a general truth, that nearly all the ammonia becomes plant food the same season it is applied, while not much over one-half the phosphoric acid can be safely counted on. If we use fish-waste on the same land the second year we may assume that all the phosphoric acid is available, for by that time the half left over from last season will have decomposed.

Waste fish, particularly manhaden, are often used along the sea-coast as a top-dressing for grass. This is a great forcing process, and for a time enormous crops of hay can be grown; but eventually, and especially on light soil, the crops grow less and less, when generally a larger quantity of fish is applied, resulting in still more harm, until the soil utterly refuses to respond, bakes

hard, and becomes apparently barren. The trouble is, it has had an enormous application of ammonia and phosphoric acid, but nearly none of potash; and the result is what always will ultimately happen on any soil where one of the three requisite elements of fertilizers is left out. Such soils are dying for the want of potash. To recuperate them, apply potash or manures rich in potash, and their fertility can be restored. Soils abounding in clay will bear fish-manuring without showing injury longer than those of a gravelly character.

Other Sources supplying Nitrogen. Guano. — At the head of "fertilizers," as distinguished from barn manure, stands guano. This may be defined as rotten sea-bird dung, with remains of birds intermixed. It is found on thousands of islands; but in large quantities on only a few. Being excrement of birds that feed on fish, it would, therefore, be found to contain the same manure elements as fish remains, but that rains dissolve and wash away the ammonia, leaving behind only phosphate. A few islands, however, lying near the Peruvian coast, are rainless; as what would otherwise be the rain-bearing wind of that region loses all its moisture in passing the high dry crest of the lofty Andes. These islands yield a guano that is rich in ammonia.

There are several kinds of guano in the market, known as Rectified, Guaranteed, Standard, Lobos, Navassa, Caribbean, etc., of which the first three named are varieties of the Peruvian (sometimes also called Chincha, or Guanape, according to the locality where found), all rich in ammonia: Standard containing from nine to ten per cent.; Lobos from five to five and one-half, and Guaranteed from six to seven. Each is rich in phosphoric acid, nearly all soluble; and has from two to three per cent of potash. The Navassa and Caribbean Sea guanos are rich in insoluble phosphoric acid, but are entirely wanting in nitrogen and potash. The Standard is quoted to me, at the time of writing (February, 1885), at $63 per ton of 2,240 pounds, and the Lobos at $48.. The analysis published by dealers gives to the former from nine to ten per cent of ammonia, twelve per cent of phosphoric acid, and three per cent of potash. The dealers assert there is no manipulation of guano except by adding sulphate of ammonia.

It is claimed that the nitrogen in the guano has a value over that contained in manure into which enters fish blood or meat as a supply of ammonia (hence called "organic nitrogen"); inasmuch as in the guano it is in a form ready to be taken up by plants,

while the fish blood and meat must first pass through the stage of putrefaction, during which part of the nitrogen is set free in a pure state, and being, in that condition, inert as plant food, is partly lost. This loss has been estimated to be from one-sixth to one-third the total amount of nitrogen contained in the substance. Be the reason what it may, no one fertilizer has given such universal satisfaction as guano. It is, indeed, the standard by which we almost instinctively measure the value of all other fertilizers.

Farmers, in buying, should remember the difference in quality between Lobos and the Standard, and should see that the price corresponds. I was told of an instance in central Massachusetts, where last season a person mixed a little guano with salt-cake, as the residue of the manufacture of sulphuric acid is called, and sold five hundred tons of the stuff as a fertilizer. He was prosecuted, but, being a lawyer, found some loophole in the law through which he crawled.

It is proper to state, right here, that the fertilizers now in the market into whose name the word "guano" enters, however good they may be, have not, as far as I can learn, a particle of Peruvian guano in their composition. I must also add that dealers in fertilizers assert that the amount of real Peruvian guano imported is but trivial, compared with the quantity sold as such; and that some of that imported into this country from England has been found grossly adulterated. All that we farmers can do is to buy it under a warrant that it contains given quantities of nitrogen, phosphoric acid, and potash. Dealers say that, in bringing the nitrogen up to that required for standard, sulphate of ammonia is used. Assuming this to be true, and that it was not obtained from any organic source, it would be of the same value as if obtained from the guano itself. From tests I made on grass land I found that Peruvian guano started the grass earlier than did an equal amount of sulphate of ammonia applied at the same time, side by side, on an equal area. This satisfied me that its nitrogen was not derived wholly, if at all, from waste fish or meat.

Ten years ago the New York Agricultural Society took up the matter of the adulteration of Peruvian guano, purchased eleven bags of as many dealers, and had them analyzed. The result gave values differing from $38.33 to $107.68, though each was sold at the same price per ton. In the report of the Connecticut Agricultural Station for 1881 it is stated that while Peruvian guano used formerly to contain not more than one or two per cent each o

soda, sulphuric acid, and chlorine, the sample analyzed that year contained about thirteen per cent of sulphate of soda (salt-cake), and eleven per cent of common salt.

The Chincha Islands, which, in past years, have been the great source of Peruvian guano, lie near the coast of Peru, — barren granite rocks, with great depth of water close to the shore, so that in places the largest vessels can lie alongside and be loaded from the land by a shoot entering the hold. The guano, a thoroughly rotten mass of bird-dung, in which are mixed feathers, carcasses, and eggs, was from four to a hundred feet in depth. Old salts have told me that they brought up the same material from deep bottom, on the flukes of their anchors. Had they said a substance looking the same, I could better believe them. From twelve to fifteen million tons have been taken from the Chincha Islands alone. Bat guano is sometimes extensively found in large caves in various parts of the world; but it varies greatly in quality.

In applying guano, the Standard, which is especially rich in ammonia, should be applied to those crops which are especially ammonia-loving; while the Lobos should be used on those which need phosphoric acid more than they do ammonia. The potash required beyond what the guano contains may be added in the form of muriate or sulphate of potash. The quantity of guano to be used will vary with the condition of the soil in natural strength and its richness by manuring in past years, the range being from two hundred and fifty to eight hundred pounds per acre. The manner of applying will depend somewhat on the crops to be raised; but a good general rule is to apply a part before the crop is planted, and make one or two applications at different stages of its growth. If scattered broadcast it should be harrowed in at once, to prevent the escape of ammonia. That used in drills I find it easy to mix thoroughly with the soil by dragging through the furrow the top of a stocky red cedar, to which a stone weighing eight or ten pounds has been firmly tied; or a brush broom similarly weighted answers very well. When used in the hill, farmers who employ help will need to look sharply after them; for I find very few farm hands will take the care necessary to incorporate it in the soil so thoroughly as to avoid destroying the young plants. In all handling of this powerful manure we must bear in mind the danger of its contact with young roots of the sprouting seed. I recall that a dozen years ago a foreman, who assured me that he knew all about the handling of guano, planted for me a couple of acres of

cabbages. A few days after they had broken ground I noticed the very dark color of the leaves, and, mistrusting the cause, ran my fingers under the plants, and brought up the pure guano. All that piece was replanted.

To insure, as far as possible, a thorough admixture with the soil in hill-planting I have a rule for each man, — after the guano has been scattered over a area as large as a dinner-plate, and covered shallow, — to draw his six-tined fork three times through it one way, three times through it the transverse way, and then, holding his fork perpendicularly in the middle, give it a twist around. Some advocate mixing it with two or three times its bulk of earth before applying. While this insures a thorough mixture, it adds considerably to the labor of distribution; and, since the plan of dragging the cedar-boughs in the drill has worked well, I have adopted that as a saving of time. However, when there is anything of a breeze blowing, it is wise to adopt some such method; otherwise your neighbors' fields will be apt to share the manure with yours.

Let me here say, I have found it an excellent plan, when distributing fertilizers, to take the earlier part of the day; for I find that, as a rule, the calmest portion. It is a good way in handling almost any fertilizer except guano, — a little damp soil is best for this, — to have plenty of water at hand, and pour a half-bucket now and then into the barrel you are spreading from, stirring it then with a hoe until, while dry enough to spread freely, it is too damp to blow away. If applying to the surface, always do it, if possible, just before a rain.

I sometimes use guano on onions, to hurry up the bottoming of the crops, — about two hundred pounds to the acre. Having scattered it with the hand, immediately follow with a slide-hoe, to work as much of it as possible into the soil, and to save loss of ammonia. This is an excellent fertilizer to use, in connection with barnyard manure, in the early season, to give the crops a start.

Market gardeners in the vicinity of our large cities have very little respect for phosphate and special fertilizers, but, using from ten to twelve cords of stable manure to the acre, think highly of guano at the rate of a thousand pounds, or bone at the rate of two thousand pounds, per acre as an adjunct; or, when stable manure alone is to be depended upon, they allow from twenty to thirty cords. Assuming the stable manure costs $7 a cord, the expense in the latter case is greater by from $70 to $120 than when guano is used in

conjunction with a less supply from the stable. Now it is the nitrates that start the plants of the market gardener, and these the guano contributes: while the development of nitrates in stable manure requires a degree of heat which the soil does not receive until the season is somewhat advanced. Without knowing it, gardeners are using this vast amount of barn manure to get a small stock of plant food which they might easily procure in the fertilizer market, ready made and directly available, in the form of guano, or nitrate of soda. It would be wiser to dispense with three-quarters of the heavy manuring, and use one-half the saving in purchasing nitrate of soda; the balance might go into their pockets as clear saving.

Hen Manure has by some been compared in value to guano; but I regard this as an over-estimate, though it contains three times as much nitrogen as barn manure. It is a grand principle that no more nitrogen, phosphoric acid, or potash, can be obtained from the manure of any animal than is fed to it in its food. An ordinary hen will eat about two bushels of corn a year, and the larger breeds about one-half more. From this they must take the material for about one hundred and twenty-five eggs annually, a change of feathers, keep up the animal heat, and make up the growth of the body, besides performing the various functions on which life depends. Now, subtracting what is required for these purposes, the waste element in our two bushels of corn shrinks to very small proportions. We must also take into account the fact that the droppings which we save are confined almost wholly to those made during half of the twenty-four hours. By analysis two bushels of corn contains, in nitrogen, potash, and phosphates, forty-six cents in value. From this stand-point it will be seen that the droppings of a hen for a year cannot contain nearly the value sometimes claimed for them. I estimate its value at from fifteen to twenty cents. For many years I collected hen manure at a cost of a dollar per barrel, but afterwards reduced its price to seventy-five cents, and thought it, at the latter price, a cheap manure until I tested it side by side with an equal value of guano. Moreover it is a sticky mass, difficult to handle; and it is worth any one's while to experiment, if it were only to realize the advantage in the handling of any commercial fertilizer over hen manure, even in its finest state. It is generally composted with muck or dryish soil, — three parts of muck to one of manure, — and the compost should be made as fine as possible. A rake is the best tool to do this with, if it is sticky. It should be turned over in

three or four days, and a six-tined fork is a good implement for this purpose.

SULPHATE OF AMMONIA, NITRATE OF POTASH, NITRATE OF SODA. — The first of these is a by-product of works where coal is used for the manufacture of gas, and is one of the principal sources supplying nitrogen. It looks like rather coarse salt, and is marketed in barrels, or larger casks, up to huge tierces weighing from a thousand to fifteen hundred pounds. It is readily soluble in water, but does not waste in the air. Nitrate of potash (saltpetre) is usually too dear a source to be available for procuring nitrogen. Nitrate of soda is found in the interior of Chili, on the surface and in the soil. It is a remarkably stimulating fertilizer. If there is much rain it will waste before plants can take it up. Mr. Lawes advises to apply it only when not more than three feet in depth of the soil will be moistened. From one hundred to two hundred pounds per acre is excellent to give grass a start in the spring; it should not be applied until the leaf has made a growth of three or four inches. In dry seasons it is better and cheaper than sulphate of ammonia, as the latter needs a degree of moisture to make plant food. Still, on the whole, the sulphate of ammonia is considered the better investment: for, *first*, it is not likely to be lost in the atmosphere; *second*, it is not too soluble; *third*, it has the power of clinging to the ingredients of the soil; clay will hold it persistently, and even pure sand, washed with water, will retain a large portion of it; and, *fourth*, its ammonia is readily changed into nitric acid by the action of the soil. Nitrate of soda, we are told, "is very liable to be adulterated with white sand or broken quartz, and with salt or the cheap potash salts. . . . The purchaser should see that it dissolves entirely in water, and does not taste distinctly of salt."

I sometimes use sulphate of ammonia to hurry along crops of onions that are rather backward, spreading two hundred pounds per acre just before they begin to bottom, and working it into the soil with a slide-hoe.

CASTOR-POMACE. — This is a waste product of the West, being the cake left after the oil has been pressed from castor beans. In using it care should be taken to keep it where animals cannot reach it. The men who spread it ought to walk with the wind; for, though not poisonous, it is extremely unpleasant in contact with the eyes or mouth. It is a favorite manure for tobacco. I have used car-loads of it in former years, on general crops, with good results.

Azotin, Ammonite, Tankage. — The first two of these are animal wastes which have been exposed to the vapor of naphtha to extract the grease. (Of late years glue-waste, of which in its crude state for years I used from one to two hundred cords annually, is also so treated.) The residue is dry and brittle, and rich in ammonia, and every way superior for fertilizing purposes to the same substances before treatment. These are not usually found in the retail market, but are purchased by manufacturers of fertilizers, at prices based on their percentage of nitrogen and phosphoric acid, as shown by analysis in each lot offered for sale. Job lots, of from five to ten tons, can sometimes be purchased of brokers, or from great slaughtering establishments like that of Armour & Co., of Chicago. Tankage is a waste product from the intestines and other parts; it contains more or less of bone, easily crumbled, and is not uniform in fineness.

Dried Blood is the blood of the slaughter-house with most of the moisture removed, leaving it in good mechanical condition for handling. It is very rich in nitrogen, and is largely used by the manufacturers of fertilizers. There are two grades, the light and the dark colored; the latter being kiln-dried. Sometimes, when the heat has been too great, it is partially burned, to the destruction of a portion of the ammonia. The nitrogen in blood acts very readily as plant food.

Cotton-Seed Meal had better be first fed, as the manure from it is almost as rich in fertilizing materials as was the meal before feeding; for, as I have stated elsewhere, full-grown animals take but a small percentage of the potash, phosphoric acid, or nitrogen that exists in their food; while butter takes none. Occasionally spoilt cotton-seed meal can be found in the market that is nearly as good for manure as the best of meal, and, being generally valued at about three-fifths as much, is a very cheap source of nitrogen and phosphoric acid. When spoilt in salt-water transportation it is generally in very hard lumps, which have to be ground in a mill.

One high recommendation of castor-pomace and cotton-seed meal is, that their manure elements are in condition for immediate use as plant food.

Hoof and Horn Shavings and Leather. — All of these are very rich in nitrogen; but it is not readily available in these substances, and therefore their value in the market is less than it would otherwise be. Hoof and horn shavings analyze as high as

11.81 per cent nitrogen; if steamed and then ground, the nitrogen they contain becomes, in a degree, available. When used to adulterate superphosphate, as they very rarely are, being ground up, the particles can be readily detected by the microscope. Horn-waste is mostly in thin, bulky shavings, which are marketed in huge bags. Several years ago I purchased a ton to test its availability and value, not having any idea of the peculiar mechanical condition of the article. Standing at my door one morning I saw a team coming down the street, with a bulk of bags piled as high as a large load of hay. While I was wondering what new product had come to town, the driver stopped abreast of my house, and told me he had a ton of horn-waste bearing my address. I got rid of this elephant the shortest and easiest way, by tumbling it into the manure cellar, and throwing the daily manure upon it until it disappeared from view. My men found combs, more or less perfect, among the mass, enough to supply their families for a year or more. This stuff is very rich in ammonia; but, though by layering it with horse manure, it might be softened and dissolved by fermentation, it is nevertheless so bulky that, even at a low figure, few farmers would care to invest in it. Leather scraps are an excellent material for mulching, and in time will decay and fertilize the ground; but if worked into tillage land they are a nuisance. They are also excellent for covering blind drains. I have seen drains put down thirty years ago, and then covered with this material, which are still in good working order.

In closing this subject I cannot do better than to quote the able remarks of Professor Goessmann: "The air contains at all times carbonic acid, and in most instances also nitric and nitrous acid and ammonia. The soil absorbs continually more or less of the former, and receives the nitrogen compounds in rain and snow. Once absorbed by the soil they find access to the plant by the roots, as carbonates and nitrates, where they assist in the formation of the organic portion of the plant. Besides this direct support of plant growth they serve, also, the very important purpose of increasing the supply of inorganic plant food; for they aid in the disintegration of the soil."

Discussion.

Mr. Gregory said, in reply to an inquiry, that he used nitrogen, in the various forms of which he had spoken, on vegetables; he

had never used it in fruit-growing. He mixes his fertilizers to suit different crops, using more potash for potatoes, and less nitrogen, than for cabbages or onions.

Major Henry Emery spoke of the effect of an excess of ammonia on the seeding of plants. It will give a large crop of fodder from corn, but the ears do not kernel out, and the same is the case with other plants. Corn wants phosphoric acid and potash.

Mr. Gregory said that he used fifty tons of fertilizers last year, which was but a small part of the whole quantity of manure used by him. He applied to corn, first active ammonia and afterwards something to perfect the seed. Corn does not need a great deal of nitrogen,—two per cent is enough,—but it wants a good deal of phosphoric acid. He thought a mixture of ammonia from different sources — the greater the number the better — was preferable to that from only one source. He did not wish to give the idea that plants want a great deal of ammonia.

Leander Wetherell thought nitrogenous manures, at the price they command in the market, too expensive to be purchased by farmers. He had tried superphosphate on good corn land, and found it better without than with ammonia. The corn was measured in baskets, and one basket was weighed, and the produce was seventy bushels of shelled corn to the acre, and a friend of his from Ohio said he never saw better corn there. The free application of ammonia tends to produce too much foliage and too little grain. A gentleman in Worcester got, in this way, an immense growth of wheat straw, but not enough grain to pay for threshing. Professor Atwater found that in many parts of Connecticut the soil did not need nitrogen. The only real question in regard to fertilizers is, whether farmers can afford to use them. They work well in connection with stable manure; superphosphate will make corn ten or fifteen days earlier than if it is not used, — a very important consideration in frosty seasons. The best course for farmers is to buy the constituents of fertilizers and mix for themselves.

Major Emery had used night-soil on corn, and got an immense quantity of fodder, but little grain. He had also used it on timothy grass, five hundred cubic feet of which, by measurement, is called a ton, but, treated with a large quantity of night-soil, it will give a thick bottom of short fodder, with little or no head, and will require six hundred and fifty cubic feet to the ton; being deficient in the elements of mineral weight, which is given to the stalks

by the proper proportional quantity of potash and phosphoric acid to correspond with the nitrogen.

Fifty bushels of corn (the estimated crop of an acre), of fifty-eight pounds to the bushel, weighs 2,900 pounds. This weight of corn will require 3,000 pounds of stalk and cob when dry, and will contain: —

Ammonia	40.22	pounds.
Phosphoric acid	39.31	"
Sulphuric "	11.30	"
Lime	18.57	"
Magnesia	17.13	"
Potash	74.78	"
Silica	83.92	"

If the quantity of potash and phosphoric acid is lessened, and the ammonia increased, it tends to increase the fodder and lessen the seed; but, if the ammonia is left out, a good, flinty corn will be the result. The stand would not look so well through June and a part of July, but at the harvesting the crop would be good, notwithstanding there was no ammonia.

The frost which often occurs about the tenth of September does much damage to late corn unless it is cut up before the frost and laid down or shocked, when it will harden and make fair grinding corn. If allowed to stand in the hill and the leaves are frozen, though not sufficiently to freeze the corn, the result will be soft corn. All chemical changes in the stalk cease after the leaves are frozen.

Col. Henry W. Wilson said that, functionally, nitrogen is the sack of the human system; the husk, and never the filling. Nature has provided pretty generally almost all the nitrogen wanted by plants, if other elements are furnished and the land is well-tilled. He believes that Nature replenishes her stores of nitrogen from the air. Farmers will do well to cease from the wild hunt for pure nitrogen. One great advantage of plaster is that it furnishes the base for compounds with nitrogen. Cyanogen is the element most in demand for peach trees.

President Moore said that the subject of nitrogen had puzzled him a good deal, but he had made up his mind in regard to it, and now he does not pay a dollar specially for it, though he might get some incidentally in bone, etc. He finds that with good cultivation

and plenty of phosphates and potash he gets as good crops as when he bought large quantities of sulphate of ammonia. Thorough tillage will develop the inert nitrogen of the soil in warm weather.

Mr. Gregory said that he did not bring nitrogen forward as a panacea. He spoke of the value of crude kainite, containing about thirty per cent of common salt and thirty per cent of chloride of potash. Agricultural chemists in Germany had found more ammonia in heaps of manure, when kainite was used, at the end of the year than there was before. Like salt or plaster it has the property of bringing out the latent power in the land, and producing crops that would not be got from it by high manuring. It has been found especially beneficial on low land, at the rate of about five hundred pounds to the acre. But the speaker warned those who might use it that it drives the soil.

A paper by Joseph H. Woodford, on "Heating Greenhouses," was announced for the next Saturday.

BUSINESS MEETING.

Saturday, March 21, 1885.

An adjourned meeting of the Society was holden at 11 o'clock, the President, John B. Moore, in the chair.

No business being brought before the meeting it adjourned to Saturday, March 28.

MEETING FOR DISCUSSION.

Heating Greenhouses.

By Joseph H. Woodford, Newton.

Mr. President and Members of the Massachusetts Horticultural Society: —

I have been asked by your Committee to say a few words about Heating Greenhouses. and they were particular in their request that what I should say should have a tendency to stimulate the discussion of this most important subject, so as to develop a general plan best adapted for the purpose; and, with this end in view, I beg to submit the following remarks.

I will say, in the first place, that simplicity and economy in the construction of heating apparatus have not yet been evolved from the minds of inventors to an extent sufficient to enable them to produce a simple, cheap, and at the same time efficient boiler for heating greenhouses, by either hot water or steam.

Any one would suppose that, with the great demand as a stimulator, and the wonderful facilities within the reach of inventors, some one of them would have turned his attention to this want of the horticulturist, and would have produced, long ere this, a heating apparatus, which, in its different sizes, would meet the wants of all; and of such moderate cost as not to nearly bankrupt the horticulturist before he completed his greenhouse.

In this connection I would say, that I think the horticulturist also is somewhat to blame for this state of affairs; for, when he contemplates building a greenhouse, what, as a general thing, does he do but look around and ask his neighbor what heater he is using, and then, without thought, adopt the same; or, perhaps, some other which some one else recommends as being superior? I know of only two horticulturists, in all my acquaintance with the craft, who are trying to improve their heating apparatus by their own handiwork; and what they are seeking for is simplicity of construction, economy of fuel, and at the same time efficiency.

In the one case a bank of horizontal pipes, surmounted by a coil of pipe, and all surrounded by brickwork, does good service, but with great waste of heat, which passes away up chimney, and ought not to be allowed to escape without doing service.

This waste heat might be used in heating water for watering plants, by placing in the chimney, in such a manner as not to interfere with the draught, a stack of pipe, through which the water should pass before using. This would be economy in the use of fuel, for we all know that a great quantity of heat passes off up the chimney which does no work and is wasted. Some authorities, who have looked into this important subject, say that half of all the heat, generated in or under the best of our horticultural heating apparatus, passes off without doing any good except to help heat up all out-doors. If we could build a fire which would last all night, and at the same time be of just sufficient intensity to properly heat the water in our boiler, there would still remain the same appreciable waste of heat. But even this cannot be done; and the question comes up, for that reason yet more exigently, what can be done with the heat that has been generated, but not utilized, under

the boiler, and is on its way up the chimney? If we cannot use this waste heat in any other way I think my suggestion of a coil of pipe in the chimney a good one where forced water is used, for all the water passing through it would become warmed to such a degree as to make it much more acceptable to growing plants than cold water, direct from the service-pipe or cistern.

The other gentleman to whom I alluded has constructed with his own hands a bank of pipe with the ends built into the surrounding brickwork and a fire-box underneath. The construction is faulty, and not to be recommended. On the top of the brickwork he has enclosed another space, through which he carries the water pipe to irrigate his growing crops. No doubt this last process will be beneficial, yet by it he does not utilize the waste heat, but is drawing constantly from the heated furnace. Therefore I am of the opinion that he would get still better results by carrying the irrigating water through a coil of pipes in the chimney. We all know that the temperature of a greenhouse can readily be reduced, and the growth of plants sadly checked, by the promiscuous introduction of cold water; and, therefore, we see the necessity of providing an economical means of supplying only warm water to growing plants.

Taking the foregoing remarks as a basis for my superstructure, I would further say, that a greenhouse heater should be constructed on scientific principles, such as shall secure adaptability for the purpose for which it is intended, together with simplicity of construction, and ease of getting at it for cleaning and repairs.

Under the first proposition we will say that the method of heating greenhouses by pipes conveying either hot water or steam is now conceded to be the best in use, and this presents the vital question: How can we heat water most economically and most expeditiously? Shall we continue, blindly, to use those boilers which are constructed in such a manner as to present to the fire a great mass of water in one solid body to be heated, or shall our boiler be constructed of pipes whereby the same body of water shall be exposed to the warming influence in small streams, and with augmented heating surface in the same space?

It strikes me that the same fire will heat the same quantity of water if divided in small tubes much more quickly, and to a more intense heat, than if in one body. Now it is an established fact that the hotter water can be made in the boiler, the faster it will circulate through the pipes, and in this way, and this only,

can a large space be heated either by hot water or steam. This point is worthy of close study and careful consideration, for the end to be attained by the horticulturist is the successful growing of plants, and to do this properly, in our cold winter climate, heat in requisite amount must be supplied all over the greenhouse, to produce the temperature required for the crop; and the only way to have at command proper temperature is to be able to heat the water in the boiler quickly.

Now, it seems to me that, for a successful heating apparatus, the water must be presented to the fire in such small, *continuous* divisions that it will become hot in the shortest space of time possible; therefore I would have my boiler constructed of tubes, and placed over the fire in such a manner that the greatest possible surface of pipe will be exposed to the heat before the heat shall pass off up the chimney and be lost. The construction can be very simple, and not expensive. For example: A bank of $1\frac{1}{2}$-inch pipe, occupying a space 5 feet long, 2 feet high, and 2 feet wide, bridged in the middle by tiles, so that the heat from the fire built under one end shall pass through the bank twice before reaching the chimney. Let the bank of pipe be enclosed in brickwork, the top of this brickwork resting on gas-pipe bearings. The whole structure should project into the greenhouse, thereby saving all the heat radiated from the furnace. The feed door should be outside, to prevent coal gas from entering the greenhouse while stoking. This plan will make a fire-box 2 feet wide by 2 feet long, which would be sufficient for heating two greenhouses 100 feet long by 20 feet wide. The water is to pass in at the bottom of the bank of pipe, and out at the top, thus being in *one* continuous small stream of 100 feet long through the bank of pipes.

The flow of water in one stream through such a length of pipe (one hundred feet), and over a live fire, ought to heat the water very hot in a short space of time, thereby making it flow through the radiating pipes with such velocity as to cause its rapid return to the boiler after giving off its heat as required. This is the great secret of successful heating, and I ask for it your most careful consideration, for, with a higher initial temperature and rapid circulation, we shall not require such large radiating pipes as four inches to heat our greenhouses, nor so many of them; for what we require to properly do the work will be kept very hot, even in the return section, by the constant and rapid passing of the current through the fire in one continuous small stream.

I would construct the flow-pipe in such a manner, as it passes from the boiler, as to immediately empty itself into a stand or expansion pipe near the boiler, and on the top of this stand-pipe I would have a valve which would open under a definite pressure, liable to be generated in case of the great heat in the water inducing steam and otherwise entailing an explosion.

Some persons — and I am one of them — assume to say that the accumulation of steam in this stand-pipe will act as a force, provided the valve is weighted, propelling the hot water through the radiating pipes, thereby very much increasing its natural velocity, and returning it again to the boiler before it loses its heat. I cannot say, from actual experience, whether this stand-pipe will act as a force or not, but am confident it will so act, and that this theory will stand the tests of science and experience against any other theory.

I have never yet seen the expansion-pipe thus placed near the boiler; yet, when we reflect on the action of hot water and steam, it seems to me that this is the proper place for it, and I hope that the plan I now propose will so commend itself to some enterprising horticulturist that it will be tried at once, for I believe that in this way, and this only, can we accelerate the flow of hot water; and therein lies the whole secret of successful heating. I conceive that this stand-pipe can be placed in such a position in the greenhouse, and the flow can be taken from it at such a depression, as to preclude the necessity of placing the boiler below the level of the surface of soil in the greenhouse. This is another very important point in construction, and is worthy of great attention. Every boiler-pit I know of is a dark, damp hole, exceedingly objectionable in every possible way, often filled with water, and disagreeable to enter. But, with the method of construction I suggest, the whole arrangement will be on the surface of the ground, and the care of the fire can be looked at as a pleasure rather than a dread.

The chimney should receive the smoke on a level with the grate, or lower down, so that all the gases from the coal will be consumed over the fire and among the pipes constituting the boiler.

The radiating pipes in the greenhouse are to be in number sufficient to properly heat the space required, *and no more*. To have more than enough pipes is detrimental, because the surplus causes the water to move sluggishly, whereas our object is velocity, and

this can only be attained with the least quantity of pipes to accomplish the proper heating.

Another very important point in construction is, that the radiating pipes should be *continuous* and without a break till they again reach the end of the greenhouse where the boiler is situated, gradually falling to this point so that no air will remain at any point in the pipes when filled with water.

A single pipe will cross the entrance end of the greenhouse on a level with the door-sill, conducting the water directly to the boiler, thus making a continuous circulation.

The radiating pipes should be four in number, two inches in diameter, of wrought iron, with screw joints. They should be painted black with a preparation of oil and lampblack, for when they are so painted they radiate more heat than if left in their natural state, and they are also preserved from rust by this application of paint. They should also be hung up one above the other around the inside of the greenhouse clear of the wood-work and the ground, so that all the heat radiated from the pipes will go to heat the air in the house, instead of being absorbed by contact with exterior masses.

A greenhouse 100 feet long, 20 feet wide, and 10 feet high under the ridge-pole, built half-span roof, with the longest roof facing south, will require about 900 feet in length of 2-inch wrought iron pipe. This would give a radiating surface of about 590 square feet, amply sufficient to properly heat the house I describe. The glass surface will be about 2,300 square feet, and the solid contents of house about 15,000 cubic feet. The quantity of water in the boiler and radiating pipes will be about 130 gallons.

I wish to say a word in regard to the construction of the grate under my boiler. I would make it of 1½-inch gas-pipe, leading from a 4-inch pipe-head, which head can be extended to take in fresh air. This fresh air will pass through the grate into a conductor placed along one side of the greenhouse under the radiating pipes. This conductor can be constructed of old 4-inch pipes, perforated with graduated holes the whole length for the equal distribution of warmed air into the greenhouse.

This is quite a novel idea, but one which will, I think, commend itself to you as feasible, when you once reflect on the quantity of heat wasted in the ash-pit, and which will be made to contribute to heating the grate-bar pipes, through which a great quantity of air must pass when these pipes are hot. At all times this grate

will indirectly introduce a supply of fresh air to the house, and in quantity sufficient to keep the air in the house alive and sweet, without the necessity of opening ventilators in dull and unsuitable weather. I do not know of so good a manner to introduce fresh air to a greenhouse as this, and at so little expense to the heating apparatus by the absorption of heat.

There should be doors so constructed in one side of the brick-work as to enable one readily to inspect the pipes, and to keep them free from ashes and dust that will lodge upon them. Ashes and dust on boiler-pipes act as a repellent to the heat, thereby causing great waste of fuel, for it takes a great deal hotter fire to heat dirty pipes than clean ones.

Such a construction as I have tried to describe, it seems to me, will do more heating with less expense of fuel than the very much more expensive apparatus now used in nearly every greenhouse in this section of country can possibly do, and as it is simple in detail, easily comprehended, and not liable to get out of order, I confidently commend it to you as the *best* heating apparatus for a greenhouse.

I sincerely hope that my few remarks will stir up a discussion of the subject which will only end when we accomplish the purpose for which we are assembled, and that is to devise a cheap and economical way of heating greenhouses.

Since writing out the foregoing remarks I have had my attention called to another gentleman, Mr. George Cartwright, who has been quietly at work with this same end in view (the economical heating of his greenhouse), and, singularly enough, he has adopted some of my most important suggestions, and they work most admirably. He has his stand-pipe close to the boiler; but in one point it is not constructed as I have proposed, inasmuch as the water from his boiler enters the stand-pipe at the bottom, whereas in my construction it enters about midway, and I think my method best, as it seems to obviate a part of the water pressure from the stand-pipe on the boiler.

Mr. Cartwright's boiler is cylindrical, and it is also the fire-box, open at the top and bottom, and resting on fire-bricks just above a shake-grate, and the coal is fed in at this top of the cylinder. When he starts the fire a direct draught is opened into the chimney; but when the fire is well alight the direct draught is closed, and the heat passes, over the top edge of the fire-box and water-jacket, down the outside, all around, and enters the chimney below the boiler.

In this way he gets nearly all the good of his fire in heating water in the boiler or jacket. His copper boiler is 2½ feet high by 16 or 18 inches diameter, and he heats a house 180 feet long by 15 feet wide with five 2-inch pipes.

This idea of heating water under pressure was first brought to my attention by Mr. Denys Zirngiebel, who has it in successful operation at his place in Needham. And now I learn that Mr. A. P. Calder has adopted the same plan, and, if he is present, will tell us of his success. Before I put any thought into this subject I never supposed that water could be heated much hotter than the steam point; and it cannot if it is not confined; but when you once confine it and apply heat you can bring it to almost any high temperature you desire, therefore you will readily see that large spaces can be heated more quickly when pressure is used. I know of a great number of greenhouse men, who are warming their houses by trying to heat from twelve hundred to fifteen hundred gallons of water with a jacket boiler surrounding a fire, but with the boiler exposed to the damp air of the stoking-pit. In some instances they begin an intense fire at noon, and keep it up till ten o'clock at night, melting the coal into clinkers, wasting great quantities of heat and causing great anxiety. A gentle continuous fire under my boiler will keep the water always hot, and can be kept in the proper condition, when a cold night overtakes one, to immediately respond to a good stoking, and carry the temperature to a point to allay all anxiety, so that one can rest in peace.

Heating greenhouses is very similar to heating dwelling-houses. Some people think that if the cold air box is wide open a great amount of heat is sure to enter the rooms, whereas the opposite is the result; and the inmates of those houses are cold, and often remark that the furnace is not a good one. Now, if some one would kindly close the air-box down to a space six inches square, all the air coming through such a space would be warmed, and the furnace pronounced a good one. Just the same experience happens with radiating pipes in the greenhouse; two-inch pipes can be kept very hot with an ordinary fire, such as would only just warm four-inch pipes; therefore I would caution horticulturists not to put in more pipes than they can properly heat very hot, for when we get more than can be so heated we are throwing away fuel, and jeopardizing our plants.

Discussion.

E. W. Wood was called on by the President, and said that he was only a learner, and had never seen a heating apparatus of the kind described in operation. If we can get a more rapid circulation, and less fire will keep it up, that is an advantage; but at present he goes to bed with more confidence than if he had only two-inch pipes in his greenhouse Nothing retains heat better than water. He replenishes his fire at three P.M., and banks it at seven. A cold windy night like the last night makes it very difficult to keep a proper temperature in the greenhouse. He would rather have it 10° below zero and still, than 15° above and windy. He does not think so much heat is lost up the chimney as he formerly did; it does not amount to much except while the draught is open to start the fire. A neighbor who thought, from his chimney being so hot, that a great deal of heat was lost through it, ran it up the length of a house on a side hill; and although very hot while he was making the fire, shortly afterwards it was nearly as cold as if there had been no fire in it.

James Cartwright had known a boiler tried with a brick partition, as recommended by the essayist, which was afterwards taken out and a plate of iron was inserted, so placed as to avoid a downward draught, and it did better. He would prefer to have a dividing partition horizontal rather than vertical, as his experience had shown that it would work better; and it is better not to have a flue dip downwards. He thought a boiler built of pipes, as recommended by the essayist, should have them connected at both ends by means of a box or drum, instead of by returning bends in the pipe, which would make too much friction and obstruct circulation through the boiler, so that there would be danger of the pipes being cold in the morning. He thought a boiler built on the plan recommended should be from eight to twelve feet long: five feet would be too short. The stand-pipe was correctly placed near the boiler; when too remote the boiler will sometimes make steam and throw the water out of the stand-pipe, and then when the steam subsides the pipes will not be full and the circulation will stop. His son (Mr. George Cartwright, who was mentioned by the essayist) has his flow-pipe dropping to the end of the house, and the return-pipe dropping also; and he uses less fuel than with large pipes. The return-pipe is hot enough in the morning to burn your hand. If you get water very hot, with bell joints there is danger of their

opening, but with screw-joints you can go to bed and feel safe. He uses a copper boiler two and one-half feet deep, with a fire-pot twenty-two inches in diameter, and carries about ten pounds' pressure; and is now heating a house by means of five two-inch pipes with greater ease then formerly, when he used seven four-inch pipes, and it takes less coal to do it. He thought a copper boiler would wear better than an iron one over a coal fire.

Mr. Woodford said that in his plan the pipes go round the house and into the boiler.

Col. Henry W. Wilson said that there are certain axioms in heating, and the best way known to scientific men for heating water is the best for horticulturists. Great ingenuity has been expended on apparatus for heating cars. The scheme proposed by the essayist has been gone over before, and it has been found that you cannot get a draught with a large chamber and a small aperture. You cannot ventilate a room by an opening into one above it. A vertical boiler is preferable to a horizontal, for all the motive of circulation is the difference in the specific gravity of hot and cold water. If water is heated you want to give it as rapid a vertical motion as possible. Friction in large pipes is less in proportion than in small pipes. Iron is not so good a material as copper or brass for a boiler, though its greater cheapness makes its use more general. Copper is a far better conductor of heat than iron. Iron is a poor conductor; if a perfect conductor be rated as 100 iron will rate as 14. The thinner the pipe is the better, so far as regards the conduction of heat. Cast iron, as being thicker than wrought iron, is not so good, but is preferred, because less subject to rust. Water itself is a very poor conductor of heat, but is able to absorb and retain a very large amount; which can be carried, by convection, to a considerable distance from the fire, — hence its value as a circulating medium. Lampblack makes an excellent paint for radiating pipes, causing more rapid radiation, which is the reverse of absorption. The radiation of lampblack is to that of iron as 100 is to 64. A tin dipper filled with hot water, if black, loses heat twice as fast as if bright.

Mr. Woodford said that he would put on a pressure of ten pounds to promote the circulation.

Col. Wilson said that the best car-heaters have no pressure. Mr. Woodford is right in placing the stand-pipe near the boiler. The expansion of a thousand gallons of water caused by heating to 212° would fill a barrel. With a vertical partition in the stand-

pipe, it would work twenty-five per cent better. The only advantage in running a water circulation under pressure is to be found in the slightly higher temperature which can be gained. Pressure is solely from the effect of steam. A pressure of five pounds to an inch, equal to about eleven feet head of water, would raise the temperature of the water when boiling to 238°, instead of 212° as in the case of open pipes. When we run under pressure we require stronger apparatus and tighter joints; and, if pressure were to be used at all, he would prefer steam, which is very easily managed. There will be a tendency to form globules of steam, which will rise in vertical pipes, and every particle must be replaced by the return-pipe. You cannot heat pipes by the plan of the essayist: there would be no heat in the two lower pipes; the water will take the shortest route to return. The most intense heat applied to the surface will not heat water a foot below it.

The speaker formerly objected to steam, but has modified his opinion in regard to it. He spoke of George Hill's house, at Arlington, as one which it would repay all interested to visit. Mr. Hill has the newest arrangements, and one foot of surface of the steam-pipes heats thirty cubic feet of the greenhouse. He has an upright boiler, which is the best heating unit, and the steam goes to the end of the house, and returns by six pipes an inch and a quarter in diameter. He uses a pressure of one pound to the square inch. There is a compensating valve by which a uniform pressure, equal to 215°, can be maintained for ten hours during sudden and severe changes of weather. The pressure could be increased if desirable; but it is not. The adjustment is simple and automatic. One of the advantages of steam over water is that it takes but very little time to heat up or to cool off the pipes, and, with good apparatus in good hands, it is more easily managed than hot water. Another advantage is, that steam affords the easiest way to moisten the air of the house when too dry; which is a protection against freezing in cold weather. A house will cool off more quickly if the air is dry than if moist, because the capacity of moist air for heat is three times as great as that of dry air.

The study of this subject will be more profitable to the owners of greenhouses than that of any other; indeed, it has an application to every part of life. Some kinds of glass will transmit the heat of the sun better than others. Great care is needed in the selection of glass for greenhouses. Any one wishing to understand the very complex questions offered by the subject of heating would do

well to study the work of Professor Tyndall on heat. He is the best authority, and his experiments can be tried by anybody.

Mr. Woodford said that Mr. Zirngiebel's houses were the first he ever saw heated under pressure. He has four houses heated by one boiler, the expansion-pipe being a hundred feet from the boiler. The furnace is like that recommended in the essay, though he could not say about the partition, but it has a coil of pipe, like a beehive, on top. An arm runs to each of the four houses, and they are heated better than any others of his houses. The whole of the water in them moves. He has a ventilator, which he opens, so that the chimney is cold. The speaker could not understand why the two lower pipes in the plan proposed by him should be cold. In this plan the furnace fire goes up and afterwards down.

William C. Strong thought that the use of steam would be more general in future, especially in large establishments where several houses are to be heated from one fire.

William D. Philbrick remarked that there seemed to be some confusion of ideas with some of the speakers in regard to the use of pressure in hot water circulation; its only advantage is in the higher temperature which can be given to the pipes; it does not render friction less or circulation more rapid, and is objectionable on account of the greater difficulty in keeping the pipes tight. If pressure is used, there must be a safety-valve on the stand-pipe or elsewhere. It is possible, under high draught on a windy night, for the water to boil over and be thrown out, so as to leave the upper part of the circulating pipes full of air and steam, which would obstruct the circulation. If he wanted pressure he would prefer steam. Mr. Hill's apparatus works perfectly.

Mr. Woodford spoke of the advantage of a greater quantity of water than is found in steam pipes.

Col. Wilson said that this advantage would not exist if the arrangements were properly made. Mr. Hill's house was kept at a temperature of 40° when the thermometer outside showed 15° below zero. The adjustment is simple and automatic, a variation of one ounce per square inch in the pressure changing the regulator; and it obviates the objections previously made against steam. The speaker knows you can send ten times the heat through pipes with steam that you can with water.

Mr. Wood said that he has a steam-heater in his dwelling-house, and though he has an automatic arrangement, he burns twice the coal there that he does in his greenhouse with hot water. He

thought the slowness with which large water pipes cool off when the fire goes out an advantage, but steam pipes get cool in fifteen minutes: and you have got to have a certain amount of heat to get steam. He makes up the fire in his greenhouse at three o'clock, and at seven leaves the draught slightly open. Mr. Hill grows cucumbers in his house, and these require more heat than the plants in the speaker's greenhouse.

George Hill said that this was his first winter with his steam-heating apparatus. He looked at a neighbor's which was satisfactory, and put in the same sized boiler. His house is one hundred and sixty-three feet by twenty, with the boiler at one end. The steam flows in a two-inch pipe and returns in six pipes an inch and a quarter each. He can get up steam with wood in fifteen or twenty minutes. Last December, when the thermometer was at 15° below zero, he fired up at eleven P.M., and gave no more fuel until nine A.M., and the temperature did not vary more than two or three degrees from fifty, without any attention. This morning (which was very cold for the season) the thermometer in this house was up to sixty, and he had to open the windows and admit air. Nothing more would be required until two or three P.M. In a cold morning the coal is exhausted more than in mild weather, when the damper is closed. He uses a cast iron sectional boiler, under one pound pressure. He thought it would not be long before we could run a house from six to twenty-four hours by an automatic arrangement. His house is on a side hill, and he thinks of putting up another. He might lose some heat up the chimney. With hot water pipes, if the sun comes out, the large body of heat in the water is wasted.

Mr. Woodford said that opening the windows directly against the pipes and letting in the air would cool off the pipes.

Mr. Strong said that it is a very serious evil, when the sun comes out, to have a great body of hot water in the pipes. He has felt that we extracted more of the caloric from the fuel in furnaces surrounded by water pipes than when steam is used: and thought that with vertical boilers a great deal of the heat went up the chimney.

Col. Wilson said that the steam fire-engine is the most perfect generator of steam: it will heat up in five minutes. Mr. Hill's boiler requires only fifteen minutes. Steam travels with great rapidity. The speaker predicted that the coming boiler will be small, with the amount of water reduced to the minimum.

Water-pipes will rust, and you are gone. He used a three-inch wrought iron pipe for hot water eight years, and it was so filled with rust that you could not see through it. Cast iron will not rust so badly as wrought iron. Asphaltum is a poor conductor; but it might pay to coat hot water pipes with it to prevent rust. It has been proposed to use crude petroleum as a heating medium instead of water, but it would be dangerous to introduce it into pipes, for it contains water, which the heat would evaporate. Besides, the inflammable vapors of petroleum are heavier than the air, and if they escaped from the stand-pipe would flow to the fire-room, and cause explosions.

Levi W. Hastings said that he has had no experience with hot water, but has used a steam-boiler like Mr. Hill's, but larger, for the last three years, and found it satisfactory. He raises chiefly roses and pinks. He has four houses, each one hundred feet long, two of which are ten feet wide, one eighteen, and one twenty; making six thousand square feet, with span roofs, all heated by one boiler. If you heat by means of water, and get up in a cold night and find the pipes cold, it takes a good while to warm up; but he can get up steam in fifteen or twenty minutes. His boiler works automatically; he puts on a three-pound weight at night, and gets up at six in the morning, and finds a pound pressure. He uses about forty tons of coal in a season. He used from fifteen to seventeen tons in the first house, and then added two more houses and used thirty-five tons. The boiler did not work well, and he put in a larger one, and he thinks he could run double the number of houses he has now with ten tons more of coal.

The Committee on Discussion announced for the next Saturday a paper by Professor G. C. Caldwell, of Cornell University, Ithaca, N.Y., on "A Comparison of Manures for the Orchard and Garden."

BUSINESS MEETING.

SATURDAY, March 28, 1885.

An adjourned meeting of the Society was holden at 11 o'clock, the President, JOHN B. MOORE, in the chair.

E. W. Wood announced the decease of Hervey Davis, and moved the appointment of a committee to prepare memorial resolutions. The motion was carried, and the Chair appointed as that Committee, Mr. Wood, Robert Manning, and Benjamin G. Smith.

The meeting was then dissolved.

MEETING FOR DISCUSSION.

A Comparison of Manures for the Garden and Orchard.

By Professor G. C. Caldwell, Ithaca, N.Y.

How to manure the garden or the orchard for the most profitable results is one of the most difficult questions that the horticulturist has to meet. Of the biggest and most solid cabbages, the earliest peas, the largest squashes, the sweetest and most prolific berries, the handsomest and most delicately flavored grapes, the most luscious peaches or pears, the earliest or the best late-keeping apples, he has an unlimited variety offered him by all the seedsmen or nurserymen in the land; and he need find no difficulty whatever in laying out to good advantage all the money he has to spare for use in this direction. Of the most suitable land on which to plant all these crops there is enough and to spare somewhere in all this wide country. Of tools and labor-saving machines of every kind, and of men and animals to run or to use them, there is no scarcity. In respect to all these supplies there is only embarrassment of riches; and no crop need fail of producing good fruit abundantly, from any want of liberal provision for its highest requirements on any of these lines.

But is there such a superabundance of supply, when we come to the matter of the highest requirements as to the food for these crops? Is there a sufficiency of a supply of such kinds of food as will, in the general run of garden and fruit culture, give the surest results? Is not the gardener's call always for more stable manure? and is the call of the fruit grower any less loud? One naturally asks, why is this so, when there are, elsewhere at least, immense if not inexhaustible quantities of the nitrogen, phosphoric acid, and potash, that are reckoned as so important plant nutrients, all to be had for the purchasing, and under so great competition that they ought to be had for as low rates as they can be sold for, paying fair profits. They can be had also in every form of combination, and every degree of assimilability, and in any desired mixture; and, further, to save the farmer or the gar-

dener the trouble of studying out for himself the kind of combination that his crop needs, mixtures are offered to him, ready made up, for each crop.

Abundant as these commercial supplies are, they do not seem fully to answer the purpose; for I doubt if the demand for animal manures is any less urgent now than it was before commercial manures became the important articles of trade that they now are. Yet, in agricultural operations, superphosphates, bone meal, nitrate of soda, and the like have, in some few cases, been made to take the place, entirely, of stable manure, with profit.

Perhaps you have heard the history of Mr. Prout's farm in England. Mr. Prout bought this farm in 1861; it comprised four hundred and fifty acres, and its cultivation in the manner to be described was, therefore, no small plot experiment. It was, when taken in hand, in a low condition of fertility; the owner asked the aid of the eminent agricultural chemist of England, the late Dr. Voelcker, as to the best way to bring the farm into good condition again. The advice was to dress it well with stable manure. After doing this with unsatisfactory results for two years application was again made to the chemist, who told the owner to use more stable manure; he said he could not afford it; then the chemist visited the farm again, examined it carefully, and suggested the use of commercial fertilizers after a certain plan. The plan was followed, and bone dust, superphosphate, dissolved guano, and nitrate of soda were the only manures used from that time on. The crops, — clover, hay, grain, straw, and everything, — were all sold standing; only an insignificant quantity of manure was made, the cultivation being almost entirely by steam. This system has now been carried on for more than twenty years. The estate cost the purchaser in the beginning, $74,500; enough more was spent upon it in improvements to make the total cost about $100,000. The annual clear profits have been, on an average, about $4,500; and it was estimated that the farm could be sold, eight years after it was taken, for twice what it had cost. Last fall the crops were reported in the "English Agricultural Gazette" as looking well, and the system was spoken of as continuing to succeed, although with the qualification that some fallows had been found necessary.

This is not the only instance on record of this kind of farming. Other cases have been reported where the system has been followed for forty years, in Germany. I give these few details in regard to

this one instance merely to show what can be done with commercial manures when intelligently used, — to show that they do contain all the food required by crops, — and that, with their assistance only, a farm can be brought up from a low condition to a higher one, and held there for a series of years; and no one can show that what is true of farm crops should not be true of garden and fruit crops as well,—if not to the same extent, yet to a large extent. They feed on the same kinds of soil, and in the same manner, and require the same nutrients in general; and the same particular nutrients that are specially important for farm crops are, so far as we know, specially important for garden and fruit crops; the proportions required may be different, but perhaps not more so than they are even for different farm crops: the same mixture of nitrogen compounds, phosphate, and potash salts will not answer equally well for wheat and for potatoes, nor even for wheat and for corn, which are more nearly alike than wheat and potatoes.

What are the obstacles in the way of the more extensive use of commercial fertilizers in the garden and fruit orchard, and of less dependence on the products of the city and village stables? In answering this question we naturally ask, first, what does stable manure contain that is not supplied in commercial fertilizers?

The valuation of a commercial fertilizer in the trade is based, as you know, on the quantities of nitrogen, phosphoric acid, and potash that it contains, — some fertilizers containing only one of these nutrients, others two, and others all three of them. There is no question that in respect to just these nutrients we can meet the wants of any crop better by supplying commercial fertilizers than we can by stable manure, if there is any difference between the two as to efficiency. But, besides these, the crop must find in the soil, supplied from some source, lime, magnesia, sulphuric acid in the form of sulphates, of which plaster is one, a very little iron, possibly chlorides, of which common salt is one, and, perhaps, silica. Every superphosphate contains an abundance of lime and of sulphuric acid. The muriate of potash, brought from Germany, is a chloride, and contains chlorine. Of iron every soil has an abundance, many thousand times more than any crop needs; and the same is true of silica; of magnesia there is enough to be had in the German kainite. But as to all of these nutrients last mentioned — sulphate, chloride, silica, iron, and magnesia — there is no proof that the average soil is not abundantly rich in them for the production of good crops. Hence it is that we are justified in

charging all the cost of a commercial manure to, and in expecting to get our money back from, its nitrogen, phosphoric acid, and potash; the rest of the ingredients must be thrown in gratis, as of no value generally, although there may be cases where one or another of them may be of some service. All of these matters the stable manure also contains in abundance.

So far no one can claim anything for the stable manure that is not supplied by the commercial fertilizer. The only respect in which the two materials are distinctly unlike is this: the stable manure is composed largely of dead vegetable and animal matters in process of decay; the product of this decay is the humus or vegetable mould of the soil. About one-fifth of ordinary stable manure is made up of this vegetable and animal matter, while not over six to eight thousandths is potash, five or six thousandths nitrogen, and three thousandths phosphoric acid. Of nitrate of soda, so much mentioned as a very useful fertilizer for its nitrogen, one-sixth is this nitrogen. Of a good superphosphate, as this fertilizer averages in this country, about one-eighth is phosphoric acid; and if one desires it, and is willing to pay for it, he can have a superphosphate with one-third its weight of phosphoric acid; of a German muriate of potash from a third to a half may be potash. But in all these materials there is no vegetable matter, and little or no animal matter.

Here, then, is a clear distinction between the two kinds of manure, the stable and the artificial: the stable manure has its few thousandths of nitrogen, of phosphoric acid, and of potash, and its one-fifth of decaying vegetable and animal matter; the commercial manure only its few thousandths or even less of animal matter, and its proportions of nitrogen, phosphoric acid, and potash counted by eighths to thirds. About three-fourths of the stable manure is only water, however; expel this, and get a manure as dry as commercial manures ordinarily are, and the comparison between the two will be more just and no less striking; we shall then see that four-fifths of this dry manure is decaying vegetable and animal matter, about one-fortieth is potash, one-eightieth phosphoric acid, and one-fiftieth nitrogen.

Can any way be now shown in which this striking difference between the two kinds of manure may account for the greater measure of success that is attained in general with the stable manure?

As already said, decaying vegetable or animal matter in the soil

makes humus, or vegetable mould. This common ingredient of all arable soils is not necessary for plant growth; for, on a small scale, in pot culture good crops have been obtained in a soil as white as snow, and therefore quite free from any humus, but containing all the real plant nutrients that have been mentioned. But that this humus is an important ingredient of a fertile soil no one can doubt. Given two soils equally rich in nitrogen, potash, phosphoric acid, lime and all such matters, but of which one is poor in humus and the other rich in it, but yet not so excessively rich as a bog or a muck bed, there is not a farmer or gardener who knows soils who would not give more for the soil rich in humus than for the other. In the course of the decay of these vegetable matters several acid substances are formed, and chiefly carbonic acid. These acids act on the large quantity of difficultly soluble plant food in every arable soil of fair quality, and aid in bringing it into solution, and thus within easy reach of the plant. Few farmers realize what a large native stock of crop food they have in their soils. In the case of a fertile soil from a Western State, analyzed some time ago in Germany, there would be, by calculation from the analysis, in one acre of it, and within a foot from the surface, 2,400 pounds of phosphoric acid and 7,000 pounds of potash. But nobody in New England has a Western prairie soil on his farm; nevertheless, judging from analyses of twenty-five different soils of average quality by the same chemist, we may say that an average good soil will contain, within twelve inches from the surface, and therefore accessible to the crops, and fit for plant food if any means can be provided for bringing it into solution, 1,500 pounds of phosphoric acid, 1,500 pounds of potash, and over 1,750 pounds of lime. Compare these amounts with those that a crop takes up, and one can realize more fully the native value of a good soil. The quantities of phosphoric acid and potash in pounds, per acre, required by some of the more common crops are shown in the following table: —

	Phosphoric Acid.	Potash.
Corn, 50 bushels and its stover . . .	50	70
Potatoes, 150 bushels	15	50
Wheat, 25 bushels and straw . . .	18	25
Apples	20	50

These native supplies, then, so very much larger than the yearly demands of the crops, if we can bring them into use only a little

every year, may go far towards producing these crops for the farmer or gardener. If humus by its decay helps to bring about the solution of these supplies, then it must be useful, since all such plant food must be taken up in solution.

That the carbonic acid, which is one of the main products of the decay of humus, does in some way favor vegetable growth is very neatly illustrated by an experiment preformed many years ago by Stoeckhardt. Three deep glass vessels, two of which had holes pierced through the bottom, were filled with soil, and peas were planted; through the hole in the bottom of one of the vessels and up through the soil there was passed every day a certain quantity of air, and up through the soil of another of the vessels a mixture of air and carbonic acid; the third vessel was left to itself, and the condition of things in it was about the same as in an ordinary soil with a very compact and impervious subsoil. The weight of dried crop produced in the third vessel without any circulation of air was about 90 grains, in the soil through which air was circulated, 162 grains, and in the soil through which air and carbonic acid were circulated, 190 grains. In some way the carbonic acid along with the air helped the crop amazingly, more than doubling it. This was not necessarily because the plant fed on this carbonic acid directly to supply itself with that most important element, carbon. It has been proved over and over again that vegetation supplies itself with carbon, at least mostly, if not entirely, from the carbonic acid of the atmosphere. The fair presumption is that the carbonic acid passed through the soil brought more plant food into solution, and so the crop was more liberally provided with this means of growth.

In support of this presumption we have the fact, demonstrated also by Stoeckhardt, that the very soil which produced the largest crop, and therefore had yielded up the largest amount of dissolved plant food, still contained the largest amount of soluble plant food, ready for the next crop. The quantity of such soluble food was, in the soil of the closed cylinder without any circulation of air, 22 grains; in the cylinder furnished only with air, 43 grains; and in the soil to which both air and carbonic acid were supplied, 60 grains.

You will have noticed that the second soil, receiving only air, also gave a notable increase both of crop, and of soluble plant food left for the next crop. On first thought this result would appear to conflict with the explanation given of the increased crop in the third soil, that it was due to the carbonic acid passed through that

soil along with the air. But there is not necessarily disagreement here; it is quite reasonable to suppose that the humus in this soil, together with the oxygen of the air that was circulated freely through it, produced the same effect and in the same way as was produced by the carbonic acid ready formed in the third soil. The formation of carbonic acid from the humus can take place only in the presence of oxygen, and the more liberal the supply of oxygen the larger will be the production of carbonic acid from a given quantity of humus. In this second soil we had, as in all the others, the ordinary quantity of humus; the supply of air, with its one-fifth part of oxygen, was liberal; carbonic acid must have been produced freely; and it would have been strange if there had been no increase of crop. Such a result would have tended to disprove just what we are seeking to prove, that the humus does a good work for the farmer by the carbonic acid given off in the soil as it decays, or oxidizes, which two terms mean much the same thing.

Another experiment shows in a no less striking manner the part that humus may take in bringing plant food into solution: a sample of a sandy loam was compared with another portion of the same soil to which some humus had been added; in the course of the summer months, while a crop was growing vigorously on these soils, the quantities of potash that became soluble in the two soils were as 366 parts in the soil poor in humus to 574 parts in the other; the quantities of plant substance produced in the two cases were 5,040 and 9,800 parts.

That the presence of decaying vegetable matters or of humus in the soil does increase the proportion of carbonic acid there, is fully shown by analysis of the air in the pores of the soil. The air above the soil contains 3 parts of carbonic acid in 10,000, while that in the soil may contain ordinarily 100 parts in 10,000; and, moreover, such richness in carbonic acid is found only in the air of soils containing humus. A rich dressing of stable manure, or, in other words, a large addition of decaying, humus-forming substance, largely increases the quantity of free carbonic acid in the soil. An asparagus bed that had not been manured for a year contained in the air in the pores of the soil 122 parts of carbonic acid in 10,000, but when recently manured 233 parts. Another, a surface soil rich in humus, had 540 parts of carbonic acid, a newly manured sandy field 333 parts, and the same soil, in wet weather, 1,413 parts, of carbonic acid in 10,000 of its air.

This function of the humus of the soil can also come into use, with respect to the plant food added in manures. To me, one of the most interesting properties of soil is that remarkable power it has of absorbing certain valuable plant nutrients, holding them in a difficultly soluble condition near the surface, so that, however much rain may leach through the ground, they will be only very slowly carried down deeper, or washed out altogether. Thus the soil behaves with phosphoric acid, with potash, and with the ammonia that is so valuable for its nitrogen. For these three substances any arable soil that is not too sandy is a most trustworthy savings-bank. Therefore, although we should make much account in buying a fertilizer of the proportion of soluble phosphoric acid, or potash, or nitrogen compounds in it, yet, in all probability, to say the least, our crops take up but a little of these nutrients before they are changed by this fixing power of the soil into a difficultly soluble condition.

Why, then, it will naturally be asked, should we pay ten cents a pound or more for soluble phosphoric acid when we can get good insoluble acid for six cents or less, if what we put on the soil as soluble so soon becomes insoluble? For this reason, partly, that the even distribution of the food through the soil is a matter of much importance. Any one can easily understand that if a bottle of the much-advertised, and I suppose very useful tonic, Horsford's acid phosphate, were poured over half a bushel of soil, and washed in with a slight drenching of water, phosphoric acid would be far more thoroughly mixed with that soil than, by any reasonable amount of stirring such as one could afford to give to a cultivated field, he could distribute two ounces of dry superphosphate through the same quantity of soil. So, when 400 pounds of superphosphate are applied to an acre of soil, in spite of the best of the usual cultivation that could be given to that soil the fertilizer would remain in little scattered particles here and there; but let the rain take it into solution for a short time, and distribute it over the surfaces of many hundred thousand particles of soil, so that the feeding rootlets find it wherever they go, and how much wider and more even the mixing of the fertilizer with the soil will be; and yet, so quickly does the soil seize hold of this traveling plant food, and insolubilize it, if I may borrow a very convenient French word with a very plain meaning, that it cannot stray far off.

Practically, then, every crop has to procure all its phosphoric

acid, all its potash, and a part at least of its nitrogen, from difficultly soluble compounds in the soil; and I think it is now easy to understand why, as so often observed, commercial fertilizers do their best work when used with stable manure: the abundance of carbonic acid generated by the fresh application of such manure assists in the re-solution of the insolubilized phosphoric acid and potash of the commercial manure, as well as of the difficultly soluble native food of the soil. Some writers consider this to be such an important function of stable manure that they condemn the practice of allowing it to rot in the yard at all; they would have all the decay go on in the field, just where the products of this decay are needed for their action on the soil. It was somewhat interesting as well as amusing, while I was writing this, to meet with the statement in an English paper, that a patent had been taken out in England for charging a soil with carbonic acid through pipes laid near the surface. A few good results of such a system would be worth more in illustration of the principle that I have been explaining than the patent will ever be worth to the inventor. No results are given, but you see that it is exactly what Stoeckhardt did, and I have no doubt that it would increase the yield of crops; but, as long as we can still get hold of any humus-forming material at reasonable rates, we have a far cheaper method of attaining the same end.

There are other ways in which humus may, and doubtless does, favor the production of crops; but, to my thinking, all of them taken together do not sum up for so much as does this one way that I have been speaking of.

We can compare stable or other animal manures in another way that may explain the reason why less satisfactory results are sometimes obtained with the latter; I refer to the comparative cost of plant food in the two kinds of manure. You are aware that the Directors of the Experiment Stations of Massachusetts, Connecticut, and New Jersey have, in the past few years, conferred together in the spring to determine what may be considered as a fair valuation per pound, of nitrogen, phosphoric acid, and potash, in their various degrees of solubility as found in these manures. The figures thus given represent the retail cost of these substances, in the markets of the State where they are sold as raw materials to be worked up into the various brands of fertilizers offered for sale during the year.

On the basis of this scale of values adopted for 1884 I think it

is fair to assume that when a gardener or a farmer buys potash in a commercial fertilizer, with the same degree of solubility and availability for plant food as in ordinary animal manures or other animal waste used for manure, he will have to pay at least five cents a pound for that potash; for phosphoric acid of like solubility and availability as in these domestic manures he would pay about nine cents a pound, and for nitrogen, sixteen if not eighteen cents; I take the lower figure to be sure that I am within bounds.

How do these prices compare with those actually paid for these plant nutrients in such animal or vegetable manures as gardeners or farmers buy?

Two or three years ago there came to me from a gentleman of this neighborhood a series of questions as to the comparative cheapness of several of these manures. The questions could be answered, at least with approximate satisfaction, since the inquirer was fortunately able to give me the cost per ton, at his own place, of all the materials in question. I had not time to analyze samples of the manures, and for the necessary information as to their composition I had to refer to the tables giving the average composition of such matters; if my estimates could have been based on actual analyses of the materials, they might have been somewhat, but certainly not very, different.

The results of my calculations are set forth in the following table: —

Kind of Manure.	Cost per 1,000 pounds.	1,000 pounds contained of			Cost, in cents, per pound of the		
		Nitrogen.	Phosphoric acid.	Potash.	Nitrogen.	Phosphoric acid.	Potash.
Cow manure	$1 16	4	1.6	3.6	19.2	10.8	6.0
Horse manure	1 54	7	1.5	9.5	14.1	7.9	4.4
Night-soil	43	7	14.0	2.0	2.8	1.6	0.9
Rockweed	1 21	4	2.3	4.0	20.5	11.5	6.3
Fish-chum, half dry	6 50	43	50.0	....	9.1	5.1	....
Hen manure	4 00	10	6.0	5.0	27.0	15.0	8.4
Tanners' waste	78	72	19.0	....	0.9	0.5	....

If my figures are not wrong, the cow manure is not a cheap source of plant food; it would have to be looked upon as more costly than commercial fertilizers were it not for the large amount of humus-forming material that it contains; this may offset the high cost of the important plant nutrients in it. But then we have just as much of this humus-forming material in horse manure; and the important plant nutrients in that, instead of being more costly than in the commercial fertilizer, are actually cheaper. The night-soil costs nothing except for the hauling; the plant food in it is remarkably cheap, costing only about a fifth as much as in horse manure; and one can see no reason why a pound of nitrogen in it should not be just as good for crop production as a pound of the same nutrient in horse manure. Rockweed is an expensive manure, much more so than commercial manures, while the plant food in it certainly cannot be any more available or valuable than in fine bone meal, or in good horse manure, or than in the fish-chum, which provides nitrogen and phosphoric acid at half the cost.

Hen manure is another expensive fertilizer: its plant food costs more than that in any other fertilizer, natural or artificial. Even nitrogen in ammonia salts costs only twenty-two cents, and phosphoric acid in the best superphosphate only ten cents a pound. From my point of view I should say that a great deal more was paid for that manure than it was worth. As to the tanners' waste I had to do some guessing; I took it to be mostly hair and clippings of fresh skins; it cost nothing, except for the hauling. If I was right in my conjecture as to its character, it is rich in both nitrogen and phosphoric acid, and is by far the cheapest manure of all; but its action may be much slower than many of the other manures in the list, which would detract from its value. Granting all that, it would still appear to be a very cheap manure.

Making all due allowance throughout these estimates for the possible deviations from the general average composition of such materials, I still affirm that where they come out so widely apart as they do in some cases, they indicate real and undoubted differences in the cost of the plant food, that may be of considerable practical importance to the buyer of such manures.

We may look for a moment, before I close, at this same matter from another point of view. On the University farm at Cornell, Professor Roberts, by a careful system of saving and housing his stable manure, and rich feeding of his stock, largely milch cows, has obtained a product that, analyzed in my laboratory, was found

to contain .7 per cent of nitrogen, .4 of phosphoric acid, and .84 of potash. The manure was applied at the rate of ten tons to the acre, which quantity would contain about 150 pounds of nitrogen, 80 of phosphoric acid, and 160 of potash. These amounts of the three nutrients would cost, in a commercial fertilizer, at the same rates per pound as in the other calculations whose results have been given, about $40; but this ten tons of manure did not begin to cost so much, — it was the waste of the animals producing a revenue by their milk or growth or work. It did undoubtedly cost something, but I think it is safe to say not over $1.50 a ton, or half as much as the horse manure, of which an account has been given above. This would make the plant food in it cost less than half as much as in that manure, and much less than in commercial fertilizers.

It may seem to many that thus far I have spoken only unfavorably of the use of commercial fertilizers; but I would not wish to leave you with the impression on your minds that I regard them with disfavor. On the contrary, I do not believe we could get along without them in general crop growing; and I see no reason why, if they are judiciously used, they should not do as much for horticulture as they are doing for agriculture. If the farmer succeeds better in getting profitable returns from an investment in a certain quantity of nitrogen, phosphoric acid, and potash in a superphosphate than the horticulturist does, it may be because the latter has not learned by experience, as the former has, how to get such returns; and as long as he can procure animal manures by any sort of management he will continue to use them rather than get out of the ruts and learn how to use something else in place of them. So far as the humus is concerned, on whose apparent usefulness I have dwelt so long, its due proportion in the soil can be maintained by green manuring, and without getting or making much stable manure; or by spreading over the uplands some of the contents of the muck deposits that are to be found on so many farms.

In order, however, to enable these commercial manures to compete with the cheaper plant food in animal manures, they must be bought at such rates, and in such ways, as to reduce the cost of the plant food they contain to as low a point as possible. A comparison of the cost of plant food in mixed fertilizers, such as superphosphate and special manures, with cash prices for precisely the same quality in the raw materials used by the manufacturers

for making up these mixed fertilizers, shows that in the last two years consumers have paid from 18 to 20 per cent more for the plant food in the former than in the latter, or the raw materials; or, stated in another way, about $33 expended in the raw materials would buy just as much and just as valuable plant food as would cost $40 in superphosphates or specials. These figures represent the *average* difference in favor of getting the raw materials directly; sometimes the superphosphate is sold at such low rates that its plant food is almost as cheap as in any other form in the market; but, on the other hand, the difference is sometimes very much larger in favor of the raw materials. For instance: in one case a Connecticut farmer was asked to pay, and perhaps he did pay, $45 for a certain quantity and quality of plant food that would have cost him but about $26 in the raw material. These raw materials are such as nitrate of soda, sulphate of ammonia, dried blood, and dried and ground fish-waste, any of which may be used for charging a fertilizer with nitrogen; plain superphosphate — that is, without any nitrogen—for supplying the soluble phosphoric acid; and potash salts for the potash.

A Connecticut farmer tried this home mixing last year, using four tons of dissolved bones, one ton of muriate of potash, and one ton of sulphate of ammonia, making thus an excellent and really ammoniated superphosphate; it cost him, including materials, freight, and labor, $36.20 per ton; analyzed at the Experiment Station, it was reported to be worth, at current prices, $45, which was a very much better showing than was made by any one of the fifty samples of superphosphate analyzed at the same station during the year. The consumer had at the same time the great advantage of knowing just what the mixture was made of; that, for example, its nitrogen was in the form of sulphate of ammonia, the most costly and the most valuable form of nitrogenous plant food, and not of roasted and ground leather waste, an utterly worthless form of nitrogenous plant food. Other farmers of that State have done likewise, and with good results also, both in the analysis and in the field.

Instead of closing with some flourish of a peroration, it will I think be more in keeping with the character of my lecture if I should sum up in a few words the main points which I have attempted to explain or illustrate: —

1. That if the elements needed for the food of the gardener's or horticulturist's crops cannot be obtained in sufficient quantity

from stable manure, or other animal waste, they can be procured in the trade, in unlimited quantity; and in every degree of availability depending on different grades of solubility; and in the greatest variety of mixtures, so as to suit any whim or fancy of crop or crop grower.

2. That profitable crop growing can be carried on, for many years at least, with these commercial fertilizers alone.

3. That the most evident distinction between stable manure and commercial fertilizers, and the distinction upon which we should, therefore, naturally base an explanation of the greater reliability of the former, is its large proportion of vegetable matter, or humus-forming material; of which commercial fertilizers contain practically none.

4. That soils contain, in a difficultly soluble condition, and therefore not easily fed upon by the crops, large supplies of all the needed elements of plant food.

5. That humus, through its decay in the soil, furnishes carbonic acid, among other solvent agents; and this carbonic acid appears to play an important part in the nourishment of crops by bringing the native, insoluble stock of plant food within their easy reach.

6. That even if we add water-soluble plant food to the soil it becomes largely insoluble before the crop can feed upon it, or needs it; therefore soluble plant food added to the soil in commercial fertilizers needs also the help of the humus, finally, for its solution.

7. That plant food in most animal and vegetable residues used as manures costs much less than in commercial manures.

8. That, in spite of the disadvantages which, under some conditions, attend the use of commercial fertilizers, they are nevertheless a very important and necessary help in crop growing.

9. That in using these fertilizers the wisest course appears to be to make one's own mixtures of the raw materials, as well for securing a better manure as for economy in first cost.

Discussion.

Professor Caldwell said, in answer to an inquiry concerning his statement that soluble substances are rendered insoluble by being mixed with the soil, that the nitrogen of nitrogen compounds passes sooner or later into the form of nitrates, especially if the

soil is permeable to the air. The nitrates leach rapidly from the soil, while the other compounds of nitrogen are not so subject to waste from this cause, and the compounds of phosphoric acid and potash suffer scarcely any appreciable waste.

Hon. James J. H. Gregory was much pleased with the essay, which dealt with the fundamental points of fertilization, and brought in one rescuing fact, — that we can use commercial fertilizers to raise cow peas or clover, and can make humus by plowing these under. Barn manure is what has passed through the animal; the part of the food retained has become a portion of the animal, and manufacturers ultimately make fertilizers of him. Dung differs in its composition from the fertilizer made from the flesh and bones of the animal only in the fact that it is diluted with a larger quantity of water.

A. W. Cheever remarked that ploughing in green crops as fertilizers is practised more in the State of New York than here. A neighbor of his applied commercial fertilizers to a piece of ground, and sowed winter rye, which when nearly ready to blossom was ploughed in as a fertilizer for corn, but proved a failure. The speaker accounted for it by supposing that the rye had absorbed all the immediately available plant food, and did not decay soon enough to feed the corn.

Professor Caldwell thought Mr. Cheever's explanation probably correct. It would have been better to put on a crop later in the season.

William H. Bowker was much pleased with the essay, as well as with other writings by Professor Caldwell, and felt no fear that his occupation as a manufacturer of fertilizers was in danger. It made little difference to him whether he sold the materials of fertilizers for mixing, or mixed them to suit the wants of farmers. There must be a margin of profit, and formerly there was a greater profit on manufactured goods than there is now. It has cost a great deal to work up the use of fertilizers to the present point. No one not in the trade has any idea of the increase; and the speaker could not tell what it would come to in the future. He saw no way to procure the materials that will be wanted for fertilizers, especially nitrogen. He advised that farmers keep more stock and feed better, using artificial fertilizers only as supplementary to barnyard manure. They should study the feeding of animals in connection with feeding the soil. He recommended cotton-seed meal as feed for stock where rich manure is desired.

Mr. Gregory thought it well for farmers to buy the raw materials and do their own mixing. He had done so and knew the inside of the business. The margin which had been referred to as necessary was due to several causes: manufacturers have to hold their stocks two years; bags cost something; there is much waste, and agents are expensive, but we are indebted to them for stimulating farmers to purchase. We ought to allow a little leeway — say three or four dollars per ton. We have hardly done justice to the manufacturers and dealers, but have made them the target for complaint and abuse on account of failure.

Professor Caldwell thought there was a difference of eighteen or twenty per cent against mixed fertilizers as compared with the raw materials, estimating the latter at cash prices. Manufacturers sell on time.

William H. Hunt was pleased with the careful statements of the essay. The cost of stable manure was estimated at less than it costs here; it would be nearly one-half more here. He thought one of the greatest advantages in using artificial fertilizers is the ease with which they are applied in the growing season, when farmers are too busy to put on stable manure. They can be put on very rapidly. They have also a great advantage for remote fields, the expense of applying them being so much less than that of applying stable manure as often to make the practical difference between planting and not planting a crop. Fertilizers can, however, be used to the best advantage in connection with stable manures.

Samuel Hartwell was surprised at the low value placed on hen manure by Professor Caldwell. The New England Agricultural Society had lately held two elaborate discussions on poultry, and all considered the excrement a very valuable fertilizer; it was supposed to resemble guano. He buys horse and cow manure at the same price per cord, and, considering the greater weight of the latter, thinks it more valuable, cord for cord.

Professor Caldwell said that guano is the dried and concentrated dung of birds fed on fish, and is much richer in plant food than the ordinary droppings from fowls fed on grain.

Mr. Cheever asked Professor Caldwell's opinion as to the economy of attempting to improve lands by ploughing in green crops, either here or in New York. Can we afford to raise clover, rye, and other crops for ploughing in, with the supplemental use of

commercial fertilizers? He had taken the ground that it was bad management to do so; and preferred to feed the crops.

Professor Caldwell did not think green manuring an economical process: it takes time; and it is better to put the crop through the animal, where stock feeding is at all profitable. Animals retain only ten per cent of the food they consume. Clover would be least profitable of all crops to plough in, because it is so good for fodder; it is too good to plough in. When cut it leaves a great deal of fertilizing material in the stubble and roots, and is an excellent preparation for wheat. He advised the ploughing in of green crops only when they cannot be used for fodder. He did not pretend to stand here as a judge of manures; but the nitrogen in the hen manure did cost twenty-seven cents per pound. Ammonia in the form of sulphate or nitrate would have cost only twenty-two cents. There is a great difference in the quality of hen manure; some is taken better care of than others.

Mr. Bowker said he had heard a great deal of talk about applying the South Carolina phosphate directly to the soil in a finely ground state, without rendering it soluble, and asked Professor Caldwell's opinion of it.

Professor Caldwell replied that very few careful experiments had been made with the South Carolina phosphates. In Europe experiments have been made with such mineral phosphates as they have there, and the results have not been favorable; but those found in South Carolina are of better quality. Writers using the term "South Carolina phosphates" sometimes mean superphosphates made from them. Superphosphate containing phosphoric acid in a soluble or reverted state has a very great advantage over the mineral, in the ease with which it is dissolved and distributed in the soil.

Rev. A. B. Muzzey said that when in Europe some years ago he called on Thomas Carlyle in company with the Massachusetts Commissioner of Agriculture, and Mr. Carlyle said to them, "Two men I honor: him who cultivates the soil, and him who educates the human mind; — and no other." These two things are often united, as in these meetings; where we have a paper, followed by a discussion of the subject by practical men. He thought the Committee on Discussions deserved great credit for their sagacity in the selection of essayists — including one lady. However much we know, there is more and better yet to be told; but the informa-

tion elicited at these meetings proves that we are on the path of progress.

President Moore said that this was the thirteenth and last meeting of the series, and that the Society was much indebted to the Committee on Discussions, and especially to the Chairman, for their success. The meetings have improved year after year, the series now closed being the best of all.

The meeting then adjourned without day.

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TRANSACTIONS

OF THE

Massachusetts Horticultural Society,

FOR THE YEAR 1885.

PART II.

BOSTON:
PRINTED FOR THE SOCIETY.
1886.

TRANSACTIONS

OF THE

Massachusetts Horticultural Society.

BUSINESS MEETING.

SATURDAY, April 4, 1885.

A duly notified stated meeting of the Society was holden at 11 o'clock, the President, JOHN B. MOORE, in the chair.

William C. Strong, Chairman of the Committee appointed on the 7th of March to consider and report what amendments, if any, are necessary to the Constitution and By-Laws, read a report, which, after a second reading by the Secretary, was unanimously voted to be entered on the records for consideration at the quarterly meeting in July.

The report was as follows: —

MASSACHUSETTS HORTICULTURAL SOCIETY,
BOSTON, March 28, 1885.

The Committee appointed to consider the expediency of making any alterations in the Constitution and By-Laws of the Society, report, recommending the following alterations:

In Section III., in the sentence "An Executive Committee of four members," change "four" to "seven," so that the sentence shall read — "An Executive Committee of seven members."

In the sentence "A Committee of Arrangements of nine members," change "nine" to "three," so that it shall read — "A Committee of Arrangements of three members."

In Section XVI., erase the words "the Ex-Presidents" in the second line of the section, and change the number "four" in the third line to "seven," so that the sentence shall read as follows: "The Executive Committee shall consist of the President, who

shall be Chairman, the Chairman of the Finance Committee, and seven members chosen as provided in Section III."

Also, in the same section, in the sentence "And at such meetings five members shall be a quorum," change the number "five" to "four," so that the sentence shall read — "And at such meetings four members shall be a quorum."

Also, in Section XXIII., in the last line but one, change the number "nine" to "three," so that the section shall close reading as follows: "And three other members shall be chosen as provided in Section III., to superintend the same."

All of which is respectfully submitted.

W. C. Strong,
Edward L. Beard,
E. W. Wood,
Samuel Hartwell,
C. H. B. Breck,
} *Committee.*

Edward L. Beard, Chairman of the Committee of Arrangements, spoke of the Special Subscription Prizes for Hybrid Perpetual Roses offered for the last six years, and of the desirability of continuing them. No motion was made on this point, and consequently no formal action was taken; but the sense of the meeting appeared to be that the matter should be left with the Committee of Arrangements.

The following named persons, having been recommended by the Executive Committee, were, on ballot, duly elected members of the Society:

Robert McMillan, of Whitinsville.
Mrs. James A. Gibbon, of Savin Hill, Boston.
Royal M. Pulsifer, of Auburndale.
George A. Parker, of Halifax.
George H. Peirce, of Concord.
George Cartwright, of Dedham.
Hon. George Heywood, of Concord.
E. W. Gilmore, of North Easton.
Charles J. Capen, of Dedham.
Philip Power, of Dedham.
Thomas B. Fitz, of West Newton.

Adjourned to Saturday, May 2.

BUSINESS MEETING.

SATURDAY, May 2, 1885.

An adjourned meeting of the Society was holden at 11 o'clock, the President, JOHN B. MOORE, in the chair.

E. W. Wood, Chairman of the Committee appointed at the meeting on the 28th of March, to prepare a memorial of Hervey Davis, presented the following report: —

The Committee to prepare resolutions in memory of Hervey Davis would report the following:

Resolved, That the members of the Massachusetts Horticultural Society have learned with deep regret of the decease of their associate, Hervey Davis; and would place on record their recognition and grateful remembrance of faithful services rendered by him for many years. He was a member of the Fruit Committee for eleven years, and Chairman for four years of that time, and discharged the somewhat difficult duties of that position without fear or favor, — so far as possible doing justice to all exhibitors. His judgment was accurate, and his decisions were rarely questioned. He had made the culture of fruit a study, and was successful in producing the finest specimens, many of which were shown at our exhibitions.

Mr. Davis was also a member of the Executive Committee for four years, and brought to its deliberations the integrity and good judgment which characterized him in all the relations of life.

All the members of the Committee which presents this memorial were associated with him on the Fruit Committee, and had the best opportunity of knowing his worth. He will long be remembered as one of the most useful members of the Society.

E. W. WOOD,
BENJAMIN G. SMITH, } *Committee.*
ROBERT MANNING,

Mr. Smith, of the Committee, spoke of the excellent judgment of Mr. Davis, and of his constant and prompt attendance at the meetings of the Fruit Committee.

President Moore expressed his concurrence with the resolutions, and with the remarks of Mr. Smith. He was for several years

associated with Mr. Davis on the Fruit Committee, and knew him to be a conscientious and truthful man, and of accurate judgment.

On motion of Joseph H. Woodford, it was unanimously voted that the report be accepted and recorded, and that a copy be sent to the family of Mr. Davis.

J. Frank Johnson, of Boston,
having been recommended by the Executive Committee, was, on ballot, duly elected a member of the Society.

Adjourned to Saturday, June 6.

BUSINESS MEETING.

Saturday, June 6, 1885.

An adjourned meeting of the Society was holden at 11 o'clock, the President, John B. Moore, in the chair.

C. H. B. Breck announced the decease of P. Brown Hovey, and moved the appointment of a Committee to prepare memorial resolutions. The motion was carried, and the chair appointed, as that Committee, Mr. Breck, Hon. Marshall P. Wilder, and William C. Strong.

The following named persons, with such as they might add, were appointed to represent the Society at the funeral of Mr. Hovey: Rev. A. B. Muzzey, Benjamin G. Smith, C. H. B. Breck, John G. Barker, George W. Fowle, E. W. Wood, Col. Henry W. Wilson, and Charles N. Brackett.

Hon. Marshall P. Wilder moved that a delegation be appointed to attend the Twentieth Session of the American Pomological Society, to be held in the state of Michigan next September, this delegation to consist of

The President, John B. Moore, *Chairman.*

Hon. Marshall P. Wilder,	E. W. Wood,
William C. Strong,	O. B. Hadwen,
Charles M. Hovey,	J. W. Manning,

Charles H. B. Breck,	Charles F. Curtis,
Benjamin G. Smith,	Warren Fenno,
Robert Manning,	William H. Spooner,
John C. Hovey,	Col. Henry W. Wilson,

and such others as the President may appoint.

[The name of Hon. Marshall P. Wilder, above entered, was added to the list by the President.]

The motion was seconded by William C. Strong, and carried unanimously.

Mr. Wilder then moved that the Society invite the American Pomological Society to meet in Boston in 1887, and provide suitable accommodation for the visiting society. This motion was referred to the Executive Committee.

On motion of Edward L. Beard, it was voted that the award of the prizes offered for Saturday, July 4, be postponed to July 11.

The following letter was read by the Treasurer:

BROOKLINE, May 28, 1885.

Mr. GEO. W. FOWLE:

DEAR SIR,—According to the will of the late Benjamin B. Davis: "To pay to the Massachusetts Horticultural Society the sum of five hundred dollars, and I direct that the sum be invested by said Society, and the income thereof appropriated for prizes for the best seedling grapes."

As this estate is being now settled, I write to inform you of the bequest, and to ask if you will conform to the conditions; and also if a check payable to your order will be right.

Yours respectfully,

MOSES WITHINGTON,
Executor of will of B. B. Davis.

It was voted that the bequest be accepted on the conditions above named.

The Secretary read a letter from the Special Committee of the General Union for the Promotion of the Cultivation of Bulbs, at Haarlem, under the patronage of His Majesty the King of the Netherlands, proposing to offer a first prize of a gold medal, a

second prize of a silver gilt medal, and a third prize of a silver medal, for the best fifty Hyacinths in fifty pots, to be competed for by nurserymen, seedsmen, and florists, at the Spring Exhibition of the Society in 1886.

It was voted to accept the proposition, and that the Secretary inform the Committee of the General Union, and that the subject be referred to the Committee on Establishing Prizes.

The Secretary also presented a letter from B. E. Fernow, Corresponding Secretary of the American Forestry Congress, asking the co-operation of the Society at the Annual Meeting of the Congress, to be held in Boston or vicinity in September next. The subject was referred to the Executive Committee.

Adjourned to Saturday, June 13.

BUSINESS MEETING.

SATURDAY, June 13, 1885.

An adjourned meeting of the Society was holden at 11 o'clock, the President, JOHN B. MOORE, in the chair.

The Executive Committee, to whom was referred the proposition to invite the American Pomological Society to hold its meeting in Boston in 1887, reported in favor of extending such an invitation, and in accordance with the report it was voted to invite that Society to hold its twenty-first session in Boston: and to provide suitable accommodations therefor.

The Executive Committee also reported in favor of accepting the invitation of the American Forestry Congress to co-operate with it in its meeting in Boston in September next, which was referred to that Committee. The report was accepted, and Charles S. Sargent and John Robinson were appointed a Committee to confer with such Committee as might be appointed by the Forestry Congress in regard to the meeting.

Joseph H. Woodford presented the following vote:

Voted, That premiums not awarded on the date in the Schedule may, at the option of the Committee, be awarded on the next

exhibition day. After considerable discussion, the motion was laid on the table.

SAMUEL HOAR, of Concord, and
ELIHU G. LOOMIS, of Bedford,

having been recommended by the Executive Committee, were, on ballot, duly elected members of the Society.

The meeting was then dissolved.

BUSINESS MEETING.

SATURDAY, July 11, 1885.

A duly notified stated meeting of the Society was holden at 11 o'clock (the preceding Saturday having been a legal holiday), the President, JOHN B. MOORE, in the chair.

The Secretary stated that Charles S. Sargent and John Robinson, who were appointed a Committee to co-operate with the American Forestry Congress at its meeting in Boston, in September next, were obliged to decline on account of pressing engagements, and, the Forestry Congress being desirous to have the arrangements for the meeting made at an early day, the President, shortly after the last meeting of the Society, appointed William C. Strong, Benjamin G. Smith, and John E. Russell a Committee in their place. This action was confirmed by the Society, and on motion of William H. Spooner it was voted that a sum not exceeding one hundred dollars be appropriated for the expenses of the meeting. It was also voted that Mr. Spooner be added to the Committee.

C. H. B. Breck, Chairman of the Committee to prepare resolutions in memory of P. B. Hovey, reported the following:

Whereas, By the will of Almighty God, an esteemed and honored friend, associate, and co-laborer has been removed from the scenes of earth to a higher life: therefore

Resolved, That by the death of Mr. Phineas Brown Hovey, a member of the Massachusetts Horticultural Society from the first year of its existence, in 1829, — of which period he was a Vice-

President for five years, a member of the Fruit Committee twenty-four years, and Chairman of the Committee of Arrangements ten years,—the Society has lost a member who has faithfully and diligently fulfilled the duties required of him in the several positions he held, with honor to himself and for the best interests of the Society.

Resolved, That the members of the Society deeply deplore the death of this noble, generous, and kind-hearted man.

Resolved, That these resolutions be placed on the records of the Society, and a copy transmitted to the family of the deceased, with the assurance of the heartfelt sympathy of the members of the Massachusetts Horticultural Society.

CHARLES H. B. BRECK,
W. C. STRONG,
MARSHALL P. WILDER, } *Committee.*

Mr. Breck added that it was his good fortune to be acquainted with Mr. Hovey more than forty years, and their relations were always the pleasantest. Mr. Hovey was an honorable and upright man, and a gentleman in every sense of the word.

Mr. Strong said that he joined very heartily in the resolutions. His acquaintance with Mr. Hovey was not as long as Mr. Breck's; but he was associated with him on the Fruit Committee, where he always found him careful and conscientious. The Society never had a member more faithful to it in all relations.

President Moore said there were only two members of the Society living who joined earlier than Mr. Hovey. It was his good fortune to make his acquaintance many years ago; and he was associated with him on the Fruit Committee, and he bore witness to the accuracy of Mr. Hovey's judgment. The annual exhibitions while Mr. Hovey was Chairman of the Committee of Arrangements were among the most prosperous held by the Society. He was an upright and honest man, and one of the most efficient members of the Society.

The resolutions were unanimously adopted by a rising vote.

The Amendments to the Constitution and By-Laws, proposed at the meeting on the 4th of April, and then ordered to be entered on the records, came up for final action, the vote being first taken on the part relating to the Executive Committee, which was unani-

mously adopted. The vote was then taken on the amendments relating to the Committee of Arrangements, which were also unanimously adopted.

On motion of Edward L. Beard, it was voted that the Committee on Establishing Prizes report on the first Saturday in August a list of prizes for Bulbs at the next Spring Exhibition.

It was also voted that the Executive Committee consider the subject of offering prizes for the best reports of Awarding Committees, agreeably to the rules of the State Board of Agriculture.

J. Wesley Barber, of Newton, and
Oliver Ditson, of Boston,
having been recommended by the Executive Committee as members of the Society, were, on ballot, duly elected.

Adjourned to Saturday, August 1.

BUSINESS MEETING.

Saturday, August 1, 1885.

An adjourned meeting of the Society was holden at 11 o'clock, the President, John B. Moore, in the chair.

E. W. Wood, Chairman of the Committee on Establishing Prizes, reported a list of prizes for bulbs at the exhibitions of the Society in February and March, 1886, which was accepted, and referred to the Committee on Publication.

The President, as Chairman of the Executive Committee, reported that that Committee had approved the appropriation of a sum not exceeding one hundred dollars for the expenses of the Committee on the meeting of the American Forestry Congress.

The President also reported, from the same Committee, a recommendation that the Society offer three prizes of $10, $8, and $6, for the best reports of Awarding Committees, agreeably to the rules of the State Board of Agriculture. The report was accepted, and it was voted that the prizes be offered.

The President appointed E. P. Richardson, Elijah H. Luke, and George Noyes additional delegates to the meeting of the American Pomological Society at Grand Rapids, Michigan, September 9–11.

It was voted that, on account of the funeral of General Grant occurring on Saturday, the 8th instant, the exhibition appointed for that day be held on Friday, the 7th.

The following named persons having been recommended by the Executive Committee, were, on ballot, duly elected members of the Society:

William R. Cabot, of Brookline,
L. W. Goodell, of Amherst.

Agreeably to the Constitution and By-Laws, the President appointed the following Committee to nominate suitable candidates for the various offices of the Society for the ensuing year: E. W. Wood, *Chairman*, John C. Hovey, Charles N. Brackett, John G. Barker, C. H. B. Breck, George S. Harwood, F. L. Harris.

Adjourned to Saturday, September 5.

BUSINESS MEETING.

Saturday, September 5, 1885.

An adjourned meeting of the Society was holden at 11 o'clock, the President, John B. Moore, in the chair.

E. W. Wood, Chairman of the Committee to nominate suitable candidates for officers and standing committees for the next year, reported a printed list, which was accepted.

It was voted that the Committee be continued, and requested to nominate candidates in place of any who might decline before the election.

Dr. Henry P. Walcott, Horace Eaton, Arthur W. Felton, Asa Clement, Samuel H. Pierce, N. B. White, and Henry L. Parker, were added to the delegates to the meeting of the American Pomological Society, at Grand Rapids, Michigan, September 9–11.

The Secretary presented, in behalf of M. Ch. Joly of Paris, a Corresponding Member of the Society, a portfolio of engravings and photographs of the International Horticultural Exposition, held in Paris in May last. The thanks of the Society were voted to M. Joly for this and other donations.

The following named persons, having been recommended by the Executive Committee, were, on ballot, duly elected members of the Society:

George A. Nickerson, of Dedham.
Joseph B. Robinson, of Allston.
Enoch E. Doran, of Brookline.

Adjourned to Saturday, September 19.

BUSINESS MEETING.

Saturday, September 19, 1885.

The meeting of September 5, having adjourned to this day, was called to order by the President, but no quorum was present and the meeting was dissolved.

BUSINESS MEETING.

Saturday, October 3, 1885.

A stated meeting of the Society, being the annual meeting for the choice of Officers and Standing Committees, was holden at 11 o'clock, the President, John B. Moore, in the chair.

The Recording Secretary stated that the requirements of the Constitution and By-Laws, in regard to notice of the meeting, had been complied with.

The President stated that the business of electing officers would be first taken up, and, agreeably to the Constitution and By-Laws, appointed Robert T. Jackson, George Hill, and Cephas H. Brackett a Committee to receive, assort, and count the votes given, and report the number.

The polls were opened at ten minutes past eleven o'clock, and it was voted that they be kept open until one o'clock.

The following named persons having been recommended by the Executive Committee, were, on ballot, duly elected members of the Society:

William J. Martin, of Milton.
Frank Wyman, of Arlington.
John Fottler, Jr., of Dorchester.
George B. Chase, of Boston.

Edward L. Beard, Chairman of the Committee on Plants and Flowers, stated that the appropriation for gratuities to be awarded by that Committee was exhausted, and asked an additional appropriation of $150. The appropriation was voted, subject to the approval of the Executive Committee.

The polls were closed at one o'clock, and the Committee to receive, assort, and count the votes, retired, and after attending to that duty, reported

The whole number of votes to be	224
Necessary for a choice	113

And the persons having the number necessary for a choice were, agreeably to the Constitution and By-Laws, declared by the presiding officer to have a majority of votes, and to be elected Officers and Standing Committees of the Society for the year 1886.

Adjourned to Saturday, November 7.

BUSINESS MEETING.

Saturday, November 7, 1885.

An adjourned meeting of the Society was holden at 11 o'clock, the President, John B. Moore, in the chair.

The President, as Chairman of the Executive Committee, reported that that Committee had approved the additional appropriation of $150 voted at the last meeting for gratuities awarded by the Committee on Plants and Flowers.

The President also reported from the Executive Committee a recommendation that the Society appropriate the following amounts for prizes and gratuities for the year 1886:

For Plants and Flowers ($200 of this amount being for gratuities during the winter months), ...	$2,800
Fruits, ...	1,700
Vegetables, ...	1,000
Gardens, ...	200
Total, ...	$5,700

The report was accepted, and, agreeably to the Constitution and By-Laws, laid on the table until the first Saturday in January.

The Recording Secretary stated that four members had been elected to the Committee of Arrangements for 1886, instead of three as provided in the Constitution and By-Laws. The consideration of the subject was postponed to the December meeting.

The Secretary read an invitation from the California State Board of Agriculture to members of the Society to attend the Fifth Annual Convention of Fruit Growers, in connection with the meeting of the Board, at Los Angeles, commencing on the 16th of November and continuing a week or more. The thanks of the Society were voted for this invitation.

Edward L. Beard, Chairman of the Committee of Arrangements, spoke of the abuse of members' tickets of admission to the exhibitions, and offered the following vote: That a Special Committee of five be appointed to consider the expediency of revising Section XXVIII. of the Constitution and By-Laws, relating to this subject. The motion was carried, and the Chair appointed as that Committee: Mr. Beard, William C. Strong, E. W. Wood, Charles N. Brackett, and Henry W. Wilson.

On motion of George W. Fowle, Treasurer, the expediency of amending Section XXIX. of the Constitution and By-Laws, relating to the discontinuance of membership, was referred to the same Committee.

The following named persons, having been recommended by the Executive Committee as members of the Society, were, on ballot, duly elected:

Edwin S. Hill, of Hyde Park.
James C. Melvin, of Newton.
Mrs. Francis B. Hayes, Senior, of Lexington.
David H. Brown, of West Medford.
William H. Forbes, of Jamaica Plain.
Jonas P. Hayward, of Ashby.
Edward Frost, of Littleton.
Albert Bowker, of East Boston.

Adjourned to Saturday, December 5.

BUSINESS MEETING.

Saturday, December 5, 1885.

An adjourned meeting of the Society was holden at 11 o'clock, the President, John B. Moore, in the chair.

The report of the Committee on the meeting of the American Forestry Congress was read by William C. Strong, Chairman.

The Annual Report of the Committee on Plants and Flowers was read by Edward L. Beard, Chairman.

The Annual Report of the Fruit Committee was read by E. W. Wood, Chairman.

The Annual Report of the Vegetable Committee was read by Charles N. Brackett, Chairman.

These reports were severally accepted and referred to the Committee on Publication.

Edward L. Beard, Chairman of the Committee appointed at the last meeting to consider the expediency of revising Sections XXVIII. and XXIX. of the Constitution and By-Laws, reported that no change was deemed necessary. The report was accepted.

William C. Strong announced the decease of Charles O. Whitmore, for many years Chairman of the Finance Committee; and moved the appointment of a Committee to prepare memorial

resolutions. The motion was carried, and the Chair appointed, as that Committee, Mr. Strong, Hon. Marshall P. Wilder, and William H. Spooner.

The President, as Chairman of the Executive Committee, presented the List of Prizes for the year 1886, agreed on by the Committee for Establishing Prizes, the same having been approved by the Executive Committee, and it was adopted by the Society.

It was voted that the Committee on Publication be requested to award the prizes offered for the best reports by the Committees on horticultural products and gardens.

The subject of one member in excess of the number prescribed by the Constitution and By-Laws having been elected to the Committee of Arrangements, — the consideration of which was postponed from the last meeting,—was taken up, and it was voted that the member having the smallest number of votes be dropped from the Committee.

The following named persons, having been recommended by the Executive Committee as members of the Society, were, on ballot, duly elected:

C. De Kay Townsend, of Melrose.
George H. Rogers, of Waltham.
Avery W. Nelson, of Somerville.

Adjourned to Saturday, December 12.

BUSINESS MEETING.

Saturday, December 12, 1885.

An adjourned meeting of the Society was holden at 11 o'clock. the President, John B. Moore, in the chair.

The Annual Report of the Library Committee was read by William E. Endicott, Chairman, accepted, and referred to the Committee on Publication.

William C. Strong, Chairman of a Committee appointed, at the Meeting for Discussion on the 14th of March, to consider the subject of a reform in the nomenclature of garden plants, reported that the Committee had noticed many instances where they would recommend changes, but refrained from specifying them, as the work must be progressive; but they recommended the passage of the following vote:

Voted, That the Committee on Establishing Prizes, in making up the Prize Schedule of the Society, adhere as closely as possible to the rules for the simplification of the names of fruits adopted by the American Pomological Society; and apply the same principles to the names of plants, flowers, and vegetables; and that the Committee on Publication pursue the same course in the TRANSACTIONS. Also that a record of all such changes be kept and submitted to the Society for its approval.

The report was accepted, and the vote was passed.

The Chairman of the Committee on Gardens asked further time to prepare his report, which was granted.

Robert Manning, Secretary and Librarian, read his annual report, which was accepted, and referred to the Committee on Publication.

Edward L. Beard, Chairman of the Committee of Arrangements, moved that there be printed on the members' tickets to the various exhibitions, instead of the words "Not Transferable," the following words: "This ticket can be used only by the member named on it and his immediate family, and if lent or transferred will be taken up." The motion was unanimously carried.

The Treasurer called attention to the large amount of assessments due from Annual Members of the Society; and it was *Voted*, That the Treasurer be directed to enforce strictly the provisions of Section XXIX. of the Constitution and By-Laws, first giving reasonable notice to such members as are now delinquent.

Also, that the Treasurer give notice to all persons who have been elected to membership, but have not paid their admission fees, to do so promptly or their names will be dropped.

Adjourned to Saturday, December 26.

BUSINESS MEETING.

SATURDAY, December 26, 1885.

An adjourned meeting of the Society was holden at 11 o'clock, the President, JOHN B. MOORE, in the chair.

William C. Strong, Chairman of the Committee appointed December 5th to prepare resolutions in memory of Charles O. Whitmore, presented the following report: —

The Committee appointed to express the regard of the Society for the late Charles O. Whitmore, report as follows:

In view of the decease of Charles O. Whitmore, Esq., the Massachusetts Horticultural Society desires gratefully to record its deep sense of indebtedness for his long, faithful, and able services as Chairman of its Committee on Finance, and also in other important offices of the Society. His untiring zeal in promoting the welfare of the Society will ever be held in thankful remembrance.

The Society also extends to the family of the deceased its sincere sympathy in their present sorrow.

WILLIAM C. STRONG,
MARSHALL P. WILDER, } *Committee.*
WILLIAM H. SPOONER,

Mr. Strong added that he regretted the absence of Hon. Marshall P. Wilder, a member of the Committee, who had been long and intimately acquainted with Mr. Whitmore, and who was competent to speak of him as few of his friends could. Mr. Whitmore was a member of the Committee to procure a site for a new hall for the Society, and also of the Committee to erect a building. He was fully impressed with the belief that this site, fronting on a main street and bounded by two side streets, was the most eligible to be found, and was extremely persistent in his efforts to secure it; and but for these efforts it is very doubtful whether we should have acquired this land and building. Though he had engaged in practical horticulture only to a small extent, he felt that without the benign influences of the cultivation of nature men would grow up in heathen darkness.

Robert Manning said that, excepting the predecessor of the present Treasurer of the Society, no one had a better opportunity than himself to know of the assiduous and constant care with which Mr. Whitmore watched over the finances of the Society during the time he was Chairman of the Finance Committee. He took pleasure in testifying to Mr. Whitmore's devotion to these and all other interests of the Society.

Benjamin G. Smith said that the members acquainted with Mr. Whitmore would always hold his memory in grateful remembrance. He spoke of an interview which he, as a member of the Nominating Committee, had with Mr. Whitmore in regard to the use of his name as a candidate for the office of President, but, though he would undoubtedly have been elected, Mr. Whitmore declined to be a candidate.

William H. Spooner said that Mr. Whitmore's connection with the purchase of the land and erection of the Society's building should be strongly emphasized. He was opposed to the movement to secure land on the Back Bay, believing a more central site preferable; and to him, and also to the late Edward S. Rand, we are largely indebted for securing this location.

President Moore said that in all probability we should not have had this hall but for the efforts of Mr. Whitmore. He was always affable, and had no selfish interest in view in serving the Society. He might at various times have been President if he had accepted the nomination.

The resolutions were unanimously passed.

Edward L. Beard, Chairman of the Committee of Arrangements, read the Annual Report of that Committee. Mr. Beard said that in presenting this report he felt very great gratification at the increased interest in the exhibitions, which afforded encouragement to hope for a further increase. If it had been prophesied beforehand that the receipts from the four paying exhibitions would increase in a few years from $600 to $3,600, it would not have been believed; but the increase of last year over the preceding year was equal to the whole average receipts for the last ten years. There is no reason why we should be limited by the present possibilities around us, and he hoped for a still further increase in the future.

The report was accepted, and referred to the Committee on Publication.

John G. Barker, Chairman of the Committee on Gardens, read the Annual Report of that Committee. Accepted, and referred to the Committee on Publication.

The President, as Chairman of the Executive Committee, reported from that Committee a recommendation that the Society make the following appropriations:

For the Library Committee, for the purchase of magazines and newspapers, binding of books, and incidental expenses of the Committee, . .	$300 00
For the same Committee, to continue the Card Catalogue of Plates, ...	100 00
For the Committee on Publication and Discussion, .	250 00
For the Garden Committee, for Prizes (additional to the $200 recommended November 7), . .	100 00
For the Committee of Arrangements, to cover the deficiency for the years 1884 and 1885, . .	94 80

The Executive Committee also recommended that an appropriation of $300 be made for the use of the Committee of Arrangements for 1886, this sum to cover all extraordinary expenses of said Committee.

Agreeably to the Constitution and By-Laws, the above recommendations were laid over until the stated meeting in January.

The President further reported, that the Executive Committee had approved the offer of the Special Prospective Prize for Seedling Native Grapes, from the fund established by the late Benjamin B. Davis.

Also, that the Executive Committee had appointed George W. Fowle Treasurer of the Society and Superintendent of the Building, and Robert Manning Secretary and Librarian, for the year 1886.

The Librarian laid before the Society several books by William Paul, of Waltham Cross, England, a Corresponding Member of the Society, and presented by him to the Library. The thanks of the Society were voted to Mr. Paul for this donation; and also to himself and his son, Mr. Arthur W. Paul, for services kindly rendered to the Society.

On motion of Joseph H. Woodford, Chairman *elect* of the Committee on Plants and Flowers, it was *Voted*, That blank entry-papers be furnished to exhibitors for the entry of Plants and Flowers at the large exhibitions of the Society. These entry-papers to be prepared by the Committee of Arrangements, and to be sent to exhibitors with an explanatory letter stating the object to be attained.

The meeting was then dissolved.

REPORT

OF THE

COMMITTEE ON PLANTS AND FLOWERS,

FOR THE YEAR 1885.

By EDWARD L. BEARD, Chairman.

As anticipated at the beginning of this year, the increase of prizes offered by the Society for 1885 has led to a marked improvement in the competition for them by exhibitors of Plants and Flowers; though a large number of the prizes were not competed for. This absence of competition was noticeable where the Schedule called for specimens of such flowering or other plants as require time and skill for their preparation. Since the stimulation of cultural skill among gardeners — professional or amateur — is one of the leading objects of this Society, it is to be regretted that there is not a more general rivalry among exhibitors in competing for such prizes in the Schedule as are offered for specimens of either hard or soft wooded, and of hardy or greenhouse plants. These prizes should be made still more liberal, at the expense of mere displays of cut flowers or flowers from the open garden, which in many cases do not call for any especial skill in culture.

The classes for specimen Azaleas, Pelargoniums (both Fancy and Zonale), Heaths, Forced Hardy and Herbaceous Plants, Stove and Greenhouse Flowering Plants, and Hydrangeas in pots, were meagrely represented, there being in many cases no entries whatsoever. In the various classes for Specimen Chrysanthemums in pots there were but two exhibitors, and these did not attempt to compete for all the prizes offered for trained plants where cultural skill was a requisite. In a community where there are numerous plant growers of acknowledged skill, this Society ought to encourage more active competition among them, in place of fostering the displays of cut flowers, which, though attractive in a degree,

do not properly exemplify the higher aims which the Society has in view.

The first informal exhibition of the Society was held on January 10th, when there was a good display of Cut Flowers, etc., and one of Native Perennials and Mosses by Mrs. P. D. Richards. This exhibitor,—who confines herself to showing the wild flowers, ferns, and mosses, indigenous to this section,—has made some of the most valuable and interesting exhibits ever noticed in our records. Every wild plant and flower, moss and fern, has been gathered in its season, at no inconsiderable expenditure of time and trouble, and exhibited not only with the botanical name but the popular English or local name appended. This has proved very instructive to thousands, and cannot be too highly commended.

On the 24th of January, S. R. Payson exhibited some magnificent specimens of *Cattleya Trianæ*, and the newer *Cattleya labiata Percivaliana*, one of the most promising of the few autumn blooming Cattleyas. One of the finest varieties ever shown of this species was among the number, and the collection was awarded a Silver Medal.

On the 31st of January, F. L. Ames brought in the new and very rare *Vanda Sanderiana*. This magnificent orchid bore a five-flowered spike, and had never been shown in bloom in this country. It received a Silver Medal.

On the 28th of February a First Class Certificate of Merit was awarded to William H. Spooner for blooms of the new English-raised Hybrid Perpetual rose, Queen of Queens, one of the whitish-pink class. It is a fine large rose, and promises to be hardy, though its qualities as a good grower are yet but indefinitely known.

The new Japanese *Primula obconica* was exhibited the same day. This is one of the best dwarf plants for winter blooming in the greenhouse ever introduced, and its rosy white blooms are persistent. It is perennial in its character, and throws up truss after truss of bloom the entire winter and far into summer. It was awarded a First Class Certificate of Merit.

E. M. Wood & Co., on the same day, offered a lot of sixteen blooms of Maréchal Niel Roses, similar to those shown by them at other times, which represented the perfection of culture; and no other exhibitor, with the exception of N. G. Simpkins, was able to divide honors with them. A Bronze Medal for cultural skill was awarded.

The cut blooms of Hybrid Perpetual Roses, shown by John B. Moore & Son on this and other dates, were rather better than the average of these noted growers, and but one lot of early forced Hybrid Roses could compete with them. This was shown by L. W. Hastings, on the 17th of March. On this day, Henry Ross exhibited *Xanthoceras sorbifolia*, a beautiful shrub, which is of doubtful hardiness in this latitude.

SPRING EXHIBITION.

March 19 and 20.

This exhibition was held under the serious disadvantage of excessively and unseasonably cold weather, so that exhibitors of Azaleas and other large plants were not as numerous as usual, but this was fully offset by the glorious display of Spring Bulbs and Orchids. It is not extravagant to say that no such exhibit was ever made in this country before, and the stimulus given by it to bulb culture can hardly be estimated.

Arthur W. Blake, a new exhibitor, was first for six Azaleas, which, though small, were well grown and bloomed, and included some of the newest and most brilliant varieties, Flambeau being exceptionally good. Mr. Blake was first for four Azaleas and for a single Azalea, while Hon. Marshall P. Wilder was first for a specimen Azalea.

Jackson Dawson took the first prize for a single plant of Hybrid Perpetual Rose with Abel Carrière, and Mrs. Francis B. Hayes took the second with Emily Laxton.

There were no entries for the four prizes for twelve blooms of Gen. Jacqueminot Rose.

The display of Tea Roses was fairly good: Catherine Mermet, Bon Silène, Cornelia Cook, and Niphetos being well shown by Delay & Meade, Edwin Sheppard, and C. M. Hovey.

John L. Gardner took the first prize for twelve single Hyacinths in pots. In this lot were

Alba Maxima,
Argus,
Charles Dickens,
La Grandesse,
La Tour d' Auvergne,
Laurens Koster,
L' Incomparable,
Obelisque,
Princess Dagmar,
Sir John Lawrence,
Snowball.

C. M. Hovey took the first prize for six Hyacinths in pots with

Amy,	Fabiola,
Baroness Van Tuyll,	King of the Blues,
Charles Dickens,	Mimosa.

C. H. Hovey & Co. took the first prize for three Hyacinths with Paix de l' Europe, Lord Palmerston, and Veronica; and also the first prize for a single Hyacinth, with Czar Peter. Messrs. Gardner and C. H. Hovey & Co. had some well grown Hyacinths in pans, which is a very effective method of showing this beautiful spring flower.

While the Hyacinths were particularly good, the Tulips were poor. Hardy Narcissi were well shown, prominent among them being the new Welsh Daffodil, Sir Watkin, a form of *N. incomparabilis*. This is distinct and fine enough to take rank with Emperor, Empress, and Horsfieldii, and is quite hardy. It was shown by E. L. Beard, who also staged some fine forms of *Cyclamen persicum*, quite in advance of the old types of this charming flower. This is a plant which is not generally well grown, but which is worth all the attention it requires.

The prizes for a General Display of Spring Bulbs were effective in bringing out good collections; the first prize being taken by C. M. Hovey. Among the Narcissi shown, were *N. obvallaris* (the Tenby Daffodil) and *Bulbocodium album*, both gems. The Tenby Daffodil is hardy, the other is not.

Denys Zirngiebel exhibited a large collection of cut blooms of Pansies in dishes, taking all of the prizes. They were a superb lot of fancy and show varieties, with firm petals, and well up to the standard of a perfect Pansy.

No Forced Hardy or Herbaceous Plants in pots were shown, which was unfortunate in view of the opportunities for effective display in this class.

The first prize for a specimen Greenhouse Plant was taken by John L. Gardner, who exhibited *Imantophyllum miniatum*; Mrs. Francis B. Hayes was second in this class, with a fine plant of *Rhododendron Veitchianum lævigatum*.

Carnations were finely shown by J. A. Foster, whose collection of long stemmed blooms was tastefully arranged with the foliage, and took the first prize. Cinerarias and Camellias were well represented.

The exhibition of Orchids was the best ever made, comprising over one hundred plants, many of them unique specimens.

F. L. Ames exhibited

Cattleya amethystoglossa.

Dendrobium Ainsworthii, with over 150 flowers.

" *Brymerianum.*

" *Wardianum;* several large plants.

" " *album.*

Odontoglossum Alexandræ, and

" *Pescatorei;* several magnificent plants, one of the latter bearing sixty flowers on one spike.

Odontoglossum triumphans, with an unequalled spike of bloom.

Phalænopsis Brymerianum.

" *Stuartiana.*

And many others of large size and rare quality.

H. H. Hunnewell exhibited

Calanthe Turneri.

Cœlogyne cristata, the Chatsworth variety; a plant three feet across, and a sheet of flowers.

Cymbidium Lowi.

Dendrobium Wardianum, a fine plant.

Odontoglossum Insleayi.

Phalænopsis Schilleriana. Several extra good varieties were shown, one plant having about seventy-five flowers open.

Sophronites grandiflora.

Besides numbers of others.

David Allan (gardener to Robert M. Pratt) exhibited

Cypripedium insigne, one of the finest plants of this species ever put on exhibition. It was about four feet across.

Dendrobium Ainsworthii, a well-bloomed plant.

" *Wardianum*, about a dozen grand plants, most of them bearing from forty to sixty flowers.

All of the Orchids were interspersed with ferns and brilliant Anthuriums, constituting such a display as is rarely witnessed. A gratifying feature of the exhibition was the award of the Society's Silver Medal to F. L. Harris (gardener to H. H. Hunnewell), David Allan (gardener to Robert M. Pratt), and W. Robinson

(gardener to F. L. Ames), for skilful culture of Orchids. The Botanic Garden at Cambridge, through W. A. Manda, its gardener, exhibited forced herbaceous plants, including *Lilium tenuifolium*, *Primula cortusoides*, *Trillium grandiflorum*, and *Doronicum Caucasicum*, the last very bright and showy. Jackson Dawson of the Arnold Arboretum showed fine and well bloomed plants of Hybrid Perpetual Roses on the Japanese stock, taking the first prize for three; and an interesting collection of hardy Primulas and Polyanthuses in pots, besides forced *Kalmia latifolia*. John B. Moore & Son took the first prize for twenty-four cut blooms of Hybrid Perpetual Roses, which were even finer than his magnificent June flowers that for three years have taken the Challenge Vase. A magnificent bloom of White Baroness took the first prize for single bloom. This promises to be a finer rose than the Merveille de Lyon. Messrs. Moore exhibited a plant of the new Hybrid Perpetual rose, Col. Felix Breton. This is the darkest rose ever shown, of good habit, promising well for freedom of bloom, and very fragrant. It was awarded a First Class Certificate of Merit.

On the 11th of April, F. L. Ames exhibited the new hybrid *Lælia Philbrickiana*, which received a First Class Certificate of Merit. He also had a collection of remarkable Orchids, comprising eight plants of *Odontoglossum Pescatorei*, all of them fine varieties; and many other rare and brilliant species.

On the 18th of April, forty-two gigantic flowers of Cornelia Cook and Catherine Mermet roses were shown by N. G. Simpkins, and nothing finer could be imagined.

MAY EXHIBITION.

May 9.

The collection of Pelargoniums at this exhibition was meagre, no entries for Zonale or Fancy varieties having been made. This exhibition has not been successful for several seasons. There was no competition for Calceolarias in pots; and very few of the prizes offered were taken.

A fine lot of Auriculas, in pots, was shown by David Allan.

RHODODENDRON SHOW.

JUNE 6.

At this exhibition, the only entry for the Hunnewell premiums was made by Mrs. Francis B. Hayes, who took the first prizes for twenty-four, twelve, six, three, and single tender varieties of Rhododendrons. The six tender varieties taking the first prize were

Baron Schroeder.	Lady Grenville,
Jennie Deans,	Lady Rolle,
John Walter,	W. E. Gladstone.

The varieties taking the first prize for three, were Auguste Van Geert, Lady Dorothy Neville, and Mrs. Thomas Longman.

There were no entries for Hardy Rhododendrons except in the class for six. The first prize in this class also was taken by Mrs. Hayes.

There was no competition for Hardy Azaleas.

H. H. Hunnewell had a large and very fine exhibit, of forty-two varieties of Rhododendrons, thirty Ghent Azaleas, twelve varieties of *Azalea mollis*, and sixty varieties of Indian Azaleas — not for competition.

On the 13th of June the exhibition of Rhododendrons was better than on the regular prize day, Mrs. Hayes contributing some new and strikingly beautiful varieties, some of the best of which were

Baron Schroeder,	Lady Rolle,
B. W. Currie,	Minnie,
Concessum,	Mrs. Heywood,
Duchess of Connaught,	Mrs. Tretton,
Duke of Connaught,	Mrs. W. Agnew,
Exquisite.	Mrs. Williams,
Fleur de Marie,	Sappho,
Francis B. Hayes,	Sir Arthur Guinness,
Helen Waterer,	Sir Colin Campbell,
Jack Waterer,	Sir James Clark,
James Mason,	Sir Joseph Whitworth,
Lady Clement,	Surprise,
Lady Falmouth,	W. H. Punchard.

Mr. Hunnewell also staged a large lot of Rhododendrons and Azaleas.

On the 20th of June, Mrs. Hayes again exhibited new varieties of Rhododendrons, fifteen in number; and was awarded a Silver Medal for them. The colors of these were if possible even more delicate and novel than those shown by her before. Among them were the following which were noted as the finest:

Baroness Schroeder,
Charles Noble,
Mabel Mears,
Maggie Heywood,
Sir Humphrey de Trafford,
Snowflake,
Souvenir de Prince d'Orange,
Vauban,
Village Maid,
Vivian Grey.

ROSE AND STRAWBERRY EXHIBITION.

June 25 and 26.

This was not quite up to the average excellence of former exhibitions, the weather proving uncertain and unfavorable.

Subscription Prizes for Hybrid Perpetual Roses.

There was sharp competition for these; John B. Moore & Son taking that for twenty-four varieties, one of each, with the following, all in the finest form and condition:

Abel Carrière,
Alfred Colomb,
Baroness Rothschild,
Charles Lefebvre,
Étienne Levet,
E. Y. Teas,
François Michelon,
George Moreau,
Horace Vernet,
La Rosière,
Mabel Morrison,
Marguerite de Roman,
Marguerite de St. Amande,
Marquise de Castellane,
Merveille de Lyon,
Mme. Eugénie Verdier,
" Gabriel Luizet,
" Marie Rady,
" Victor Verdier,
Pierre Notting,
Queen of Queens,
Sir Garnet Wolseley,
Ulrich Brunner,
Victor Verdier.

Messrs. Moore also took the prize for eighteen varieties, one of each.

David Allan took the special prizes for twelve and four varieties, three of each; and John S. Richards that for six varieties.

John L. Gardner took the Amateur's Prize for twenty-four different varieties, and the prizes for six of any two varieties, and eighteen of different varieties.

Society's Prizes.

John B. Moore & Son were first in the competition for the Society's Prizes for Hybrid Perpetual Roses, with the exception of the classes for six named varieties, three of each, and three named varieties, three of each; the first prizes for these going to John S. Richards. The first prize for Moss Roses, in both classes, went to John B. Moore & Son.

The lack of competition for the Society's prizes indicates that the classes are too large, few exhibitors having Roses enough to fill a class where three each of twenty-four varieties are required.

The general display of Roses was fine; and exhibitors generally were prompt in renewing their boxes and collections on the second day of the exhibition.

There was no competition for the prizes for Stove and Greenhouse Flowering Plants; but the show of Orchids was notably good. F. L. Ames took the first prize for twelve, and also for six varieties. In his collection, were

Cattleya Gaskelliana,	*Odontoglossum Alexandræ*,
Cypripedium albo-purpureum,	" *Cobbianum*,
" *ciliare*,	" *maculatum*,
Masdevallia Harryana magnifica,	" *Pescatorei*,
	" *vexillarium*.

David Allan (gardener to R. M. Pratt) and E. W. Gilmore had fine collections of Orchids; the former taking the second prize for twelve plants, and the latter the first for three.

A First Class Certificate of Merit was awarded to F. L. Ames for the new variegated Stove Plant *Lœa amabilis*, a very promising species.

All of the classes for Cut Flowers were well represented except that for Herbaceous Pæonies.

The Saturday Exhibitions through the summer were up to the average in quality, and attracted more than ordinary attention.

Iris Kœmpferi was well shown by John L. Gardner on the 11th of July; and it is hoped that more attention will be paid to the cultivation of this beautiful species of Iris.

Hollyhocks were well shown on the 18th of July; though they would be far more attractive if exhibited on the stalks, and not in flat dishes where their beauty is completely lost. E. Sheppard took the first prize for twelve, and Edwin Fewkes the first for six.

Not a prize for Hydrangeas on the 25th of July was taken; nor for *Lilium longiflorum*. The latter is, in many cases, not proving hardy; and its out-door culture has been very much reduced. The first prizes for Sweet Peas and Verbenas went to Edwin Fewkes and A. A. Hixon, respectively.

Stocks and Balsams were poorly represented on the 1st of August; there being no entry in the former class, and but one in the latter.

F. L. Temple exhibited *Hypericum aureum* and *Gaillardia grandiflora*, both of which received First Class Certificates of Merit. A similar Certificate was awarded to Edwin Fewkes for *Milla biflora*, which, treated in the same manner as the gladiolus, is one of the finest white flowered bulbs for the garden yet introduced. A First Class Certificate of Merit was awarded to John C. Hovey for *Orostachys spinosa*.

John B. Moore & Son took the first prize for Perennial Phloxes on the 8th of August; and the first prize for Petunias went to A. A. Hixon.

William Martin (gardener to Henry P. Kidder), exhibited some splendid specimens of Achimenes in pots, and received a First Class Certificate of Merit.

James Cartwright took the first prize for twenty varieties of Gladioli on the 15th of August; and the first for one spike, the variety being Ambrose Verschaffelt. Mr. Cartwright was also first for the General Display. The quality of the Gladioli, in general, was good; and this exhibition was a fine one. Denys Zirngiebel exhibited eight pots of his Seedling White Aster, and received a First Class Certificate of Merit. Grown in this way, the Aster becomes highly decorative for conservatories or dwellings.

Edwin Sheppard took the first prize for Truffaut's Asters on the 22d, Warren Heustis the second; and Mr. Sheppard was first for Victoria Asters. L. W. Goodell took the first prize for Pompons.

At this exhibition, E. H. Hitchings had *Utricularia clandestina*, not shown before. A Silver Medal was awarded to N. S. Simpkins for splendid specimens of *Nymphæa rubra*, *N. Devoniensis*, *N. Zanzibarensis aurea*, and *N. dentata*.

There was a slim show of *Lilium lancifolium* and Tropæolums, on the 29th; but a good lot of Marigolds was shown by S. S. Hovey, taking the first prize.

V. H. Hallock, Son, & Thorpe, of Queens, N.Y., exhibited nine varieties of Gladioli, seedlings from *Saundersii*, all showing the characteristics of that species; but all highly decorative and brilliant in color, yet not up to the standard of a first class Gladiolus as to spike and shape of flowers.

A good exhibit of Dianthus was made on the 5th of September, the first prize going to L. W. Goodell, who has been very successful in improving this flower.

Joseph Tailby exhibited a plant in bloom of the new Tea Rose, William Francis Bennett, for which a First Class Certificate of Merit was awarded. This rose can never take the place of the Gen. Jacqueminot as it has been claimed it would do. It is almost as single as Safrano, and though handsome and well colored in the bud state, soon opens and has a tendency to fade. As a rose to be used only while unopened, it will no doubt prove valuable, particularly if free in blooming. A First Class Certificate of Merit was awarded to C. M. Hovey for Tea Rose Perle d'Or, and one to Edwin Fewkes for Heliotrope Roi des Noirs. This is certainly the darkest heliotrope known, but lacks that fragrance possessed by other varieties.

ANNUAL EXHIBITION.

September 15, 16, 17, and 18.

This was, so far as comparison can go, the best, in most respects, ever held by the Society. It served to demonstrate, however, that this exhibition has outgrown the halls. In the five thousand square feet of the upper hall alone, enough plants were grouped to fill effectively double the space.

Evergreen Trees and Shrubs.—William C. Strong took the first Hunnewell premium for these.

Stove and Greenhouse Plants.—H. H. Hunnewell took the first prize for ten, though it was very difficult to decide between this lot and S. R. Payson's. The successful collection comprised

Alocasia macrorhiza var.,
Anthurium crystallinum,
Cissus discolor,
Croton fasciatus,
Cycas circinalis,
Ficus Parcelli,
Licuala grandis,
Maranta virginalis,
Phyllotænium Lindeni,
Sphærogyne latifolia.

Specimen Flowering Plants.—David Allan (gardener to R. M. Pratt) was first for six in bloom, as follows:

Allamanda Schottii,
Curcuma Roscoeana,
Dipladenia profusa,
Ixora Westii,
Nerine coruscans,
Vallota purpurea.

The plant of *Anthurium Andreanum* shown by David Allan took the first prize for a single specimen in this class.

Variegated Leaved Plants (other than Crotons or Dracænas).—Mr. Hunnewell was first for six, as follows:

Alocasia Thibautiana,
Bertolonia Van Houttei,
Dieffenbachia Bausei,
Dieffenbachia magnifica,
Maranta fasciata,
" *rosea picta*.

G. A. Nickerson took the first prize for a single specimen, with the finest colored Croton Queen Victoria ever shown in the hall.

Caladiums.—F. L. Ames was first for four as follows:

Candidum,
Duchess of Teck,
John R. Box,
Mad. Fritz Kœchlin.

Ferns.—The first prize for six was taken by F. L. Ames, with the following named plants:

Davallia Mooreana,
Gleichenia dicarpa,
" *dichotoma*,
Microlepia hirta cristata,
Nephrolepis davallioides furcans,
Polypodium plumosum.

Adiantums.—David Allan was first for six, as follows:

A. concinnum,
A. cuneatum,
A. Farleyense,
A. gracillimum,
A. Matthewsiana,
A. Williamsii.

Lycopods.—Here also Mr. Allan was first with

L. cæsium,
L. densum,
L. hæmatodes,
L. variabilis.

Dracænas.—The first prize for six was taken by H. H. Hunnewell, who had the following, all finely grown and colored:

D. Bella,
D. Harrisii,
D. Lindeni,
D. Mr. Hunnewell,
D. Sheppardi,
D. Youngii.

Crotons. — F. L. Ames was first for six, with the following varieties:

Baron Frank Selliere,	Mortefontainensis,
Dayspring,	Mortii,
Disraeli,	Nevilliæ.

Palm. — The magnificent plant of *Cocos Bonnetti* shown by S. R. Payson took the first prize for a specimen palm.

In Nepenthes, F. L. Ames was first with *Chelsoni*, *hybrida maculata*, and *splendida*.

Orchids. — The first prize for six went to F. L. Ames, who had

Cœlogyne Cummingii,	*Dendrobium formosum*,
" *Massangeana*,	" *Lowii*,
Cypripedium Veitchii,	*Oncidium incurvum*.

For three Orchids E. W. Gilmore was first, with *Dendrobium formosum giganteum*, *Saccolabium Blumei majus*, and *Oncidium incurvum*. The prize for a single Orchid went to F. L. Ames for *Epidendrum prismatocarpum*.

Cut Flowers. — The display of Gladioli, Dahlias, and other cut flowers, was very bright and well kept up during the exhibition.

A Silver Medal was awarded to David Allan for *Alocasia Sanderiana*, and one to H. H. Hunnewell for *Asparagus plumosus scandens*.

The platform of Greenhouse and Stove Plants shown by William J. Martin (gardener to Henry P. Kidder), was deservedly admired; the specimens of Fuchsias in flower especially giving evidence of Mr. Martin's skill; while the whole lot was well grown and admirably arranged.

The tank of Nymphæas and Nelumbiums from Edward D. Sturtevant, of Bordentown, N. J., was exceedingly attractive. N. S. Simpkins also exhibited fine flowers of Nymphæas in the same tank.

A very noticeable new plant, *Ataccia cristata*, remarkable however only for its rarity and weird form, was exhibited by F. L. Ames. It was given a First Class Certificate of Merit.

On the 7th of November an especially good plant of *Helleborus niger*, in a pot, was shown by John C. Hovey, bearing probably

fifty pure white flowers. It had been lifted from the open ground, and the earliness of its bloom under those conditions was surprising. This ought to become one of the most valuable plants for winter forcing.

CHRYSANTHEMUM SHOW.

November 12 and 13.

The annual exhibition of Chrysanthemums was in many respects the most successful ever given in Boston; though the competition was not what it should have been, some of the strongest growers of Chrysanthemums being wholly unrepresented.

The upper hall of the Society, comprising five thousand square feet, was devoted to Chrysanthemums in pots and the Orchid display; while the lower hall was given over to cut blooms, and fruit and vegetables. Even both of these large halls were inadequate to hold the aggregated collections.

The first prize for six Chinese Chrysanthemums was taken by Dr. H. P. Walcott, with the following varieties:

Baron Beust,	Mrs. Forsythe,
Bruce Finlay,	Mrs. Sharp,
King of Crimsons,	Mrs. Shipman.

These were magnificent plants, in twelve-inch pots, grown naturally, the blooms not tied down, and each plant between four and five feet high,— averaging five feet across. The same rating applied to all the plants exhibited by Dr. Walcott, which in respect of growth, were admitted to be the best ever shown in one lot in this country.

Dr. Walcott was also first for three Chinese: Mrs. Dixon, Christine, and Alfred Salter. He was also first for six Japanese, with glorious plants of

Bouquet Fait,	La Charmeuse,
Flambeau,	Nevada,
Golden Dragon,	President Parkman.

For three Japanese, Dr. Walcott came first, with Fair Maid of Guernsey, Moussillac, and Belle Valantinan.

For four Pompons, Dr. Walcott was first with

Golden Mdlle. Marthe,	Mdlle. Marthe,
La Vogue,	Salamon.

Dr. Walcott took the first prize for a specimen Chinese Chrysanthemum, with Gladstone, and the first prize for a specimen Japanese Chrysanthemum, with Fernand Feral. His only competitor in these classes was a new grower, Edwin Fewkes, whose plants, while smaller, were yet well grown and very clean and perfectly flowered. He took all the second prizes for specimens.

The first prize for forty specimens, not less than ten varieties, was awarded to E. W. Wood, who staged handsome plants of the following:

Annis,	Mabel Wood,
Bouquet Fait,	Madame B. Rendatler,
Citronella,	M. Plauchinan,
Damio,	Mr. George Glenny,
Dr. Sharpe,	Mr. George Rundle,
Elaine,	Prince Alfred,
Fremy,	Prince of Wales,
Fair Maid of Guernsey,	Semiramis,
Golden Circle,	Snowball,
Golden George Glenny,	Souvenir de Mercedes,
Golden Dragon,	Sœur Melanie,
Gray's Golden Beverly,	Temple of Solomon,
John Salter,	White Eve.

Edwin Fewkes was second in this class and Patrick Malley third.

The first prize for Anemone Flowered Chrysanthemums was taken by Dr. Walcott with a grand specimen of Timbale Argent. Other collections were shown by Norton Brothers, Hovey & Co., Warren Heustis, and Mrs. Francis B. Hayes. Among the collections and specimens many new varieties were shown, the Japanese class predominating.

The display of cut blooms was very large, and hundreds of seedlings were shown. It is evident that while the disposition to grow these is laudable, and should be encouraged, on the other hand there is risk of crowding the field with varieties which are not distinct or remarkable. Many named kinds have been put on the market, which a year hence will be thrown aside by growers as worthless. Standing out in marked distinction from the average run of seedlings was a magnificent white reflexed flower shown by Dr. Walcott. This, which was labelled C 10, was considered the finest white seedling ever shown in Boston, or anywhere else.

It is a perfectly shaped, globular flower, with firm strap-shaped petals of such pure color that Elaine looks dusky beside it. The petals reflex in such a way that the flower appears to be globular, and the centre is filled to perfection. The specimen on exhibition measured nearly five inches. It was awarded a First Class Certificate of Merit. Dr. Walcott showed blooms of other fine seedlings, notably a yellow and a pink Japanese flower, both very large and promising, A Silver Medal was awarded Dr. Walcott for an immense plant of his seedling B 25. This is a small reflexed flower of vigorous habit, but whose chief charm is its intense dark yellow color. It is quite distinct in this respect, and will prove a valuable acquisition. Other fine seedlings of Dr. Walcott, viz.: George Walcott, lilac striped; Colorado, yellow; and Algonquin, yellow; were shown and generally admired. Mr. Fewkes exhibited a group of seedlings, all of good form and color.

A large group of seedlings was shown by Patten & Co., most of them inclining to be open-eyed; but noticeable for the varying forms and colors, which were pleasing.

J. Lewis Childs, of Queens, N. Y., staged a good group of cut blooms, and E. M. Allen, also of Queens, exhibited a bronzy yellow seedling called Brazen Shield.

In the competition for cut blooms Edwin Fewkes was first, with twelve blooms of Chinese Chrysanthemums. This was a very perfect lot; the names were

Barbara,	Mr. Bunn,
Eve,	Mr. Corbay,
Hereward,	Nil Desperandum,
Isabella Bott,	Princess Teck,
Lady Slade,	Rival Little Harry,
Mabel Ward,	St. Patrick.

He was also first for six blooms of Chinese, as follows:

General Slade,	Mrs. Forsythe,
Guernsey Nugget,	Pietro Diaz,
Lord Wolseley,	Princess of Wales.

Edwin Sheppard staged twelve cut blooms of Japanese Chrysanthemums, and took the first prize in this class. The first prize for twenty-four sprays of Japanese blooms went to Edwin Fewkes, for unexampled specimens of

Album plenum,
Aurore Boreale,
Baron de Prailly,
Beauté de Toulouse,
Bend Or,
Boule d'Or,
Bouquet Fait,
Carmen,
Daimio,
Dr. Masters,
Flambeau,
Fulton,
Gloire de Toulouse,
Gloire Rayonnante,
L'Incomparable,
La Frizure,
M. Paul Fabre,
Margot,
Mme. Clemence Audiguier,
Moonlight,
Oracle,
President Parkman,
Source d'Or,
Souvenir de Haarlem.

Mr. Fewkes took the first prize for twenty-four sprays of Chinese, as follows:

Antonelli,
Barbara,
Cherub,
Eve,
Faust,
General Slade,
Golden Queen,
Hereward,
Hero of Stoke Newington,
Isabella Bott,
Jardin des Plantes,
Jeanne d'Arc,
Mabel Ward,
Mr. Bunn,
Mr. Corbay,
Mr. George Glenny,
Mrs. Dixon,
Mrs. Forsythe,
President Sanderson,
Princess Teck,
Rival Little Harry,
Souvenir de Mercedes,
Talford Salter,
Venus.

Mr. Fewkes was first for six blooms of Japanese:

Baron de Prailly,
Belle Paule,
Chinoisiere,
J. Delaux,
Mrs. C. Cary,
Soleil Levant.

The display of Orchids was large, the stage being filled with splendid specimens. F. L. Ames took the first prize for three orchids, showing *Cypripedium insigne Maulei*, with eighteen flowers, *Odontoglossum Alexandræ*, and *Vanda Sanderiana* — the latter bearing a spike of seven highly-colored flowers. E. W. Gilmore was second with *Oncidium ornithorynchum* three feet across, *Odontoglossum grande*, and a fine specimen of *Saccolabium*

Blumei majus. The third prize for three orchids was won by F. L. Ames, with *Vanda cœrulea*, *Phalænopsis amabilis*, and *Cypripedium Spicerianum*, the latter with fifteen flowers open. E. W. Gilmore was fourth with *Dendrobium formosum giganteum*, *Oncidium varicosum*, and *Lycaste Skinneri*.

David Allan took the first prize for a specimen orchid with *Vanda cœrulea*, bearing two large spikes. F. L. Ames was second with a large specimen of *Cypripedium Harrisonianum*. W. A. Manda, of the Cambridge Botanic Garden, had a fine lot of orchids and rare greenhouse and hardy plants. Mr. Ames exhibited for the first time *Cypripedium tesselatum porphyreum*, a fine hybrid, and *Cypripedium tonsum*, a species. Both are striking orchids, and received First Class Certificates of Merit. There were brilliant collections of cut flowers from many other exhibitors, which in this limited report cannot be alluded to in detail.

Herbaceous Plants. — The prizes for the exhibits of this season having been taken the greatest number of times by Miss S. W. Story, the Society's Silver Medal was awarded to her in conformity with the Schedule; and the Bronze Medal to Anthony McLaren, who was second in competition.

Prospective Prizes. — There were two entries for the best Seedling Flowering or Foliage Plant, as follows: V. H. Hallock, Son, & Thorpe, of Queens, N. Y., entered their Seedling *Lilium speciosum*, Opal. This is a good form of *speciosum*, with petals spotted with carmine. H. B. Watt entered his Seedling Gladiolus, Fairy. This is a pure white variety, with a well-formed spike, and showing evidence of good habit. The Committee defer any action on these entries until they can have further opportunity to determine the absolute value of the productions named.

The amount awarded during the year has been $2,716, out of the sum of $2,750 appropriated; of this amount $1,712 was given for prizes, and $1,004 for gratuities.

Respectfully submitted.

Edwd. L. Beard,
David Allan,
J. H. Woodford,
James Cartwright,
Edwin Fewkes,
P. Norton,
} *Committee on Plants and Flowers.*

PRIZES AND GRATUITIES AWARDED FOR PLANTS AND FLOWERS.

January 10.

Gratuities: —

Mrs. Francis B. Hayes, Camellias and Cut Flowers,	$2 00
Stillman S. Hovey, Cut Flowers,	1 00
Mrs. P. D. Richards, Native Mosses and Perennials,	2 00

January 17.

Gratuities: —

Mrs. Francis B. Hayes, Camellias,	2 00
W. K. Wood, Vase of Flowers,	2 00
C. M. Hovey, Camellias and Violets,	1 00

January 24.

Gratuity: —

John L. Gardner, six pots Lilies of the Valley,	2 00

January 31.

Gratuities: —

Mrs. Francis B. Hayes, Camellias and Cut Flowers,	2 00
C. M. Hovey, *Cypripedium insigne*,	2 00
" " *Helleborus niger*, Otto,	1 00

February 7.

Gratuities: —

Mrs. Francis B. Hayes, Camellias,	2 00
Miss Sarah W. Story, Cut Flowers,	1 00

February 14.

Gratuity: —

Mrs. Francis B. Hayes, Camellias,	2 00

February 21.

Gratuities: —

Mrs. Francis B. Hayes, Camellias, etc.,	2 00
C. M. Hovey, Camellias,	1 00
Mrs. E. M. Gill, Narcissus, etc.,	1 00

February 28.

Gratuities: —

E. M. Wood & Co., sixteen Maréchal Niel Roses,	5 00
John B. Moore & Son, Hybrid Perpetual Roses,	5 00
William H. Spooner, Hybrid Perpetual Roses,	1 00
Mrs. Francis B. Hayes, Camellias and Rhododendrons,	3 00
Delay & Meade, Cut Blooms of Niphetos, Catherine Mermet, and Cornelia Cook Roses,	3 00
C. M. Hovey, *Imantophyllum Van Houttei*,	2 00

C. M. Hovey, Cut Flowers,	$3 00
Miss Sarah W. Story, Cut Flowers,	2 00
Stillman S. Hovey, " "	2 00
W. K. Wood, Vase of " "	2 00

MARCH 7.

Gratuities: —

Mrs. Francis B. Hayes, collection of Camellias and Cut Flowers,	3 00
John B. Moore & Son, Hybrid Perpetual Roses,	3 00
Jackson Dawson, Hybrid Perpetual Roses on Japanese stock,	2 00
C. M. Hovey, Azalea in pot,	2 00
" " Cut Flowers,	2 00
Miss Sarah W. Story, Cut Flowers,	1 00
William H. Spooner, Hybrid Perpetual Roses, Marguerite de Roman and Heinrich Schultheis,	1 00
Delay & Meade, collection of Tea Roses,	2 00

MARCH 14.

Gratuities: —

L. W. Hastings, Hybrid Perpetual Roses,	4 00
John B. Moore & Son, " " "	3 00
William H. Spooner, " " "	1 00
Eben Bacon, Pot Rose, Merveille de Lyon,	1 00
C. H. Hovey & Co., Camellias,	2 00

SPRING EXHIBITION.

MARCH 19 AND 20.

INDIAN AZALEAS. — Six named varieties, in pots, Arthur W. Blake,	$12 00
Second, Arthur W. Blake,	10 00
Two named varieties, Arthur W. Blake,	6 00
Second, Arthur W. Blake,	4 00
Specimen plant, named, Marshall P. Wilder, Reine des Roses,	5 00
Second, Arthur W. Blake, Duchesse de Fernan Nunez,	4 00
Four named varieties, in not exceeding ten-inch pots, Arthur W. Blake,	10 00
Second, Marshall P. Wilder,	2 00
Single plant of any named variety, in not exceeding an eight-inch pot, Arthur W. Blake, *Amœna Caldwelli*,	3 00
Second, Marshall P. Wilder, Rhenania,	2 00
HYBRID PERPETUAL ROSES. — Three plants, distinct named varieties, Jackson Dawson,	8 00
Second, Mrs. Francis B. Hayes,	6 00
Single named plant, Jackson Dawson, Abel Carrière,	5 00
Second, Mrs. Francis B. Hayes, Emily Laxton,	4 00

Twenty-four cut blooms, not less than six distinct named varieties, excluding General Jacqueminot, John B. Moore & Son,	$12 00
Six cut blooms, distinct named varieties, John B. Moore & Son,	5 00
Single bloom of any named variety, John B. Moore & Son, White Baroness,	2 00
Second, John B. Moore & Son, Mad. Victor Verdier,	1 00
TENDER ROSES, IN VASES. — Twelve blooms of Bon Silène, S. Niel,	3 00
Second, Delay & Meade,	2 00
Twelve blooms of Catherine Mermet, C. M. Hovey,	5 00
Second, Delay & Meade,	4 00
Twelve blooms of Cornelia Cook, Delay & Meade,	5 00
Twelve blooms of Niphetos, Delay & Meade,	5 00
Second, Edwin Sheppard,	4 00
Twelve blooms of Safrano, Edwin Sheppard,	3 00
Second, S. Niel,	2 00
Twelve blooms of Souvenir de la Malmaison, the second prize to Delay & Meade,	4 00
ORCHIDS. — Six plants in bloom, F. L. Ames,	12 00
Second, H. H. Hunnewell,	10 00
Third, David Allan,	8 00
Three plants in bloom, H. H. Hunnewell,	8 00
Second, F. L. Ames,	6 00
Third, David Allan,	5 00
Single plant in bloom, F. L. Ames, *Odontoglossum Roezli*,	5 00
Second, David Allan, *Dendrobium Ainsworthii*,	4 00
Third, F. L. Ames, *Odontoglossum triumphans*,	3 00
GREENHOUSE PLANT. — Specimen in bloom other than Azalea or Orchid, named, John L. Gardner, *Imantophyllum miniatum*,	5 00
Second, Mrs. Francis B. Hayes, *Rhododendron Veitchianum lævigatum*,	4 00
CYCLAMENS. — Six plants in bloom, Edward L. Beard,	6 00
Two plants in bloom, Edward L. Beard,	3 00
Single plant in bloom, Edward L. Beard,	2 00
HEATHS, OR EPACRISES. — Three plants in bloom, the second prize to C. M. Hovey,	3 00
HARDY PRIMROSES, OR POLYANTHUSES. — Six plants, of distinct varieties, in bloom, Jackson Dawson,	4 00
Second, Jackson Dawson,	3 00
CINERARIAS. — Six varieties in bloom, in not over nine-inch pots, E. W. Gilmore,	8 00
Second, Edwin Sheppard,	6 00
Third, Jackson Dawson,	4 00
Single plant in bloom, E. W. Gilmore,	3 00
Second, Edwin Sheppard,	2 00
VIOLETS. — Six pots, in bloom, Edwin Sheppard,	3 00

PANSIES. — Six distinct varieties, in pots, in bloom, Denys Zirngiebel,	$5 00
Second, C. M. Hovey,	4 00
Fifty cut blooms, in the Society's flat fruit dishes, Denys Zirngiebel,	3 00
Second, Denys Zirngiebel,	2 00
Third, Denys Zirngiebel,	1 00
CARNATIONS. — Display of cut blooms, not less than six varieties, in vases, J. A. Foster,	4 00
Second, Denys Zirngiebel,	3 00
CAMELLIAS. — Display of named varieties, cut flowers, with foliage, not less than twelve blooms of not less than six varieties, C. M. Hovey,	4 00
Second, Mrs. Francis B. Hayes,	3 00
Six cut blooms of not less than four named varieties, with foliage, John L. Gardner,	2 00
CUT FLOWERS. — Display in the Society's glass vases, W. K. Wood,	8 00
Second, Mrs. Francis B. Hayes,	6 00
BASKET OF FLOWERS. — Best arranged, James O'Brien,	8 00
HYACINTHS. — Twelve distinct named varieties in pots, one in each pot, in bloom, John L. Gardner,	10 00
Second, C. H. Hovey & Co.,	8 00
Third, C. M. Hovey,	6 00
Six distinct named varieties in pots, one in each pot, in bloom, C. M. Hovey,	6 00
Second, C. H. Hovey & Co.,	5 00
Third, John L. Gardner,	4 00
Three distinct named varieties, in pots, one in each pot, in bloom, C. H. Hovey & Co.,	4 00
Second, C. M. Hovey,	3 00
Single named bulb, in pot, in bloom, C. H. Hovey & Co., Czar Peter,	2 00
Second, John L. Gardner, Czar Peter,	1 00
Three pans, ten bulbs of one variety in each pan, John L. Gardner,	6 00
Second, C. H. Hovey & Co.,	4 00
TULIPS. — Six six-inch pots, four bulbs in each, in bloom, John L. Gardner,	5 00
Second, James O'Brien,	4 00
Third, C. M. Hovey,	3 00
Three six-inch pots, four bulbs in each, in bloom, the second prize to C. M. Hovey,	3 00
Third. C. H. Hovey & Co.,	2 00
POLYANTHUS NARCISSUS.—Four six-inch pots, three bulbs in each, in bloom, Edward L. Beard,	6 00
Second, Edward L. Beard,	4 00

HARDY NARCISSUS OR DAFFODILS. — Best display, Edward L. Beard, ... $6 00
Second, C. M. Hovey, ... 4 00
JONQUILS. — Four six-inch pots, six bulbs in each, in bloom, C. H. Hovey & Co., ... 3 00
Second, John L. Gardner, ... 2 00
GENERAL DISPLAY OF SPRING BULBS, all classes. — C. M. Hovey, 15 00
Second, C. H. Hovey & Co., ... 10 00
Third, Edward L. Beard, ... 8 00
LILY OF THE VALLEY. — Six six-inch pots, in bloom, John L. Gardner, ... 4 00
Second, James O'Brien, ... 3 00

Gratuities: —
Mrs. Francis B. Hayes, Azaleas and Roses, ... 10 00
John B. Moore & Son, Cut Roses, ... 5 00
L. W. Hastings, " " 4 00
William H. Spooner, pot of Merveille de Lyon Roses, . . . 3 00
Delay & Meade, Tea Roses, ... 3 00
John B. Moore & Son, New Roses, Lord Frederick Cavendish and Souvenir de Reine Leveque, ... 2 00
Jackson Dawson, Roses, Primroses, etc., ... 5 00
" " Roses, ... 2 00
John L. Gardner, Primroses, Mignonette, Anemones, etc., . . 6 00
Frederick L. Ames, Pot Orchids, ... 20 00
H. H. Hunnewell, Pot Orchids, ... 10 00
David Allan, gardener to R. M. Pratt, Pot Orchids, . . . 10 00
E. W Gilmore, Orchids, ... 5 00
W. A. Manda, " 2 00
Mrs. E. M. Gill, Amaryllis, ... 2 00
W. A. Manda, Palms and Foliage Plants, ... 12 00
" " Herbaceous Plants, in pots, ... 3 00
C. M. Hovey, Pot Plants, ... 5 00
Joseph Tailby, Wreath. 4 00
Benjamin G. Smith, Pinks, etc., ... 1 00
Miss Sarah W. Story, Cut Flowers, ... 2 00
David Allan, " " 5 00
H. H. Hunnewell, " " 5 00
Frederick L. Ames, " " 3 00
Stillman L. Hovey, " " 3 00
Edwin Sheppard, " " 3 00
C. M. Hovey, " " 2 00
Mrs. P. D. Richards, Mosses, etc., ... 2 00

MARCH 28.

Gratuities: —
John B. Moore & Son, Hybrid Perpetual Roses, twenty-four varieties, ... 3 00.

Mrs. Francis B. Hayes, Hybrid Perpetual Roses,	$2 00
" " " Pot Azaleas and Cut Flowers,	3 00
" " " Pot Rose, Édouard Morren,	1 00
John L. Gardner, Hyacinths,	2 00
Mrs. A. D. Wood, Vase of Flowers,	2 00

April 4.

Gratuities: —

Mrs. Francis B. Hayes, Cut Flowers,	3 00
" " " Pot Rose,	1 00
W. H. Badlam, *Primula vulgaris*, twelve pots,	2 00
John B. Moore & Son, Hybrid Perpetual Roses,	2 00

April 11.

Gratuities: —

Frederick L. Ames, varieties of *Pescatorea*,	6 00
John L. Gardner, *Cytisus elegans*,	2 00
C. D. Kingman, Seedling double white Pelargonium,	1 00
Mrs. Francis B. Hayes, Cut Rhododendrons,	1 00
" " " Cut Flowers,	1 00
W. K. Wood, " "	1 00
Miss Sarah W. Story, " "	1 00
Mrs. E. M. Gill, " "	1 00
Edwin Sheppard, " "	1 00
Stillman S. Hovey, " "	1 00

April 18.

Gratuities: —

N. S. Simpkins, forty-two cut blooms of Cornelia Cook and Catherine Mermet Roses,	4 00
W. H. Badlam, Twelve Primroses and six Polyanthuses,	2 00
Edwin Fewkes, Plant of *Tropæolum tricolorum*,	1 00
Edward L. Beard, Pansies,	1 00
Miss Sarah W. Story, Cut Flowers,	1 00
Mrs. E. M. Gill, " "	1 00

April 25.

Gratuities: —

Mrs. Francis B. Hayes, *Rhododendron fragrantissimum*,	1 00
Edwin Fewkes, Double Primrose, Cloth of Gold,	1 00
Mrs. A. D. Wood, Vase of Flowers,	1 00
Miss Sarah W. Story, Cut Flowers,	1 00
Mrs. E. M. Gill, " "	1 00
Mrs. P. D. Richards, Native Flowers,	1 00

MAY EXHIBITION.

May 9.

Indian Azalea.—Single plant in pot, named, C. M. Hovey, Mad. Miellez,	$6 00
Second, C. M. Hovey, Chilsoni,	5 00
Basket of Flowers.—Mrs. E. M. Gill,	4 00
Second, Mrs. S. S. Hovey,	3 00
Pansies.—Fifty cut blooms in the Society's flat fruit dishes, the second prize to Mrs. E. M. Gill,	3 00
Third, William A. Bock,	2 00

Gratuities:—

David Allan, Auriculas,	5 00
" " Orchids,	5 00
Edwin Sheppard, Orchids,	3 00
C. M. Hovey, Camellias,	1 00
Mrs. Francis B. Hayes, Cut Flowers,	3 00
Miss Sarah W. Story, " "	2 00
Stillman S. Hovey, " "	2 00
Edwin Sheppard, " "	2 00
Mrs. P. D. Richards, Wild Flowers,	2 00
Mrs. E. M. Gill, " "	1 00

May 23.

Gratuities:—

Jackson Dawson, Weigelas, Pyrus, etc.,	2 00
Mrs. Francis B. Hayes, Rhododendrons and Violas,	1 00
Miss Sarah W. Story, Cut Flowers,	1 00
Mrs. A. D. Wood, " "	1 00
Mrs. P. D. Richards, Wild Flowers,	1 00

RHODODENDRON SHOW.

June 6.

Rhododendrons.—Twenty-four tender varieties, named, Mrs. Francis B. Hayes,	$10 00
Twelve tender varieties, named, Mrs. Francis B. Hayes,	6 00
Six tender varieties, named, " " "	3 00
Three tender varieties, named, " " "	2 00
Single truss of any tender variety, named, Mrs. Francis B. Hayes, Towardii,	1 00
Six hardy varieties, named, Mrs. Francis B. Hayes,	3 00
Hardy Azaleas.—From any or all classes, cluster of trusses, of one variety, Benjamin G. Smith,	1 00
Tree Pæonies.—Six named varieties, Marshall P. Wilder,	3 00

CLEMATIS.— Named varieties, display of cut blooms, Joseph H. Woodford,	$3 00
HARDY FLOWERING TREES AND SHRUBS.— Largest and best collection, named, cut blooms, Benjamin G. Smith,	5 00
NATIVE PLANTS — Display of named species and varieties, one bottle of each, Mrs. P. D. Richards,	3 00
CUT FLOWERS.— Display, filling one hundred bottles, W. K. Wood,	4 00
Second, Mrs. E. M. Gill,	3 00
HERBACEOUS PLANTS. — Miss Sarah W. Story,	2 00

Gratuities: —

H. H. Hunnewell, Forty-two varieties of Rhododendrons,	10 00
Mrs. Francis B. Hayes, Cut Rhododendrons,	5 00
Edwin Sheppard, " "	2 00
H. H. Hunnewell, Thirty Ghent Azaleas,	5 00
" " Twelve varieties of *Azalea mollis*,	2 00
" " Sixty varieties of *Azalea Indica*,	2 00
Edwin Sheppard, Azaleas,	2 00
Mrs. Francis B. Hayes, Flowering Trees and Shrubs,	3 00
Edwin Sheppard, Primroses, etc.,	1 00
Miss Sarah W. Story, Cut Flowers,	2 00
Benjamin G. Smith, " "	1 00
Robert T. Jackson, Wild Flowers,	2 00
E. H Hitchings, " "	2 00
Miss Mary L. Vinal, " "	1 00

JUNE 13.

Gratuities: —

Mrs. Francis B. Hayes, One hundred and fifty blooms of Rhododendrons; also Iris and Azaleas,	10 00
H. H. Hunnewell Rhododendrons and Azaleas,	10 00
J. H. Woodford, Clematis and Roses,	2 00
Miss Sarah W. Story, Herbaceous Plants,	1 00
Edwin Sheppard, Cut Flowers,	3 00
Mrs. E. M. Gill, " "	2 00
Mrs. E. S. Joyce, " "	2 00
Miss S. W. Story, " "	2 00
Mrs. P. D. Richards, Wild Flowers from Essex County,	2 00

JUNE 20.

Gratuities; —

John B. Moore & Son, Roses, Pæonies, and Clematis, including twelve varieties of Moss Roses,	5 00
Mrs. Francis B. Hayes, Roses,	2 00
" " " Rhododendrons, etc.,	5 00
" " " Fifteen new Rhododendrons,	3 00
Miss Sarah W. Story, Herbaceous Plants,	1 00

E. L. Beard, *Rosa rugosa alba*, and Double Pyrethrum,	$1 00
John C. Hovey, Double Pyrethrums, four varieties,	1 00
Miss Sarah W. Story, Cut Flowers,	2 00
J. H. Woodford, " "	2 00
Edwin Sheppard, " "	2 00
Miss E. M. Harris, " "	1 00
Benjamin G. Smith, " "	1 00
Mrs. E. S. Joyce, " "	1 00
Miss Mary L. Vinal, Wild Flowers,	1 00

ROSE AND STRAWBERRY EXHIBITION.

JUNE 25 AND 26.

Special Subscription Prizes.

HYBRID PERPETUAL ROSES. — Twenty-four of different varieties, named, John B. Moore & Son, Silver Vase, value,	$40 00
Second, William H. Spooner, Silver Vase, value,	25 00
Six Roses, of different varieties, named, John S. Richards, Silver Vase, value,	15 00
Twelve Roses, of different varieties, named, David Allan, Silver Vase, value,	20 00
Eighteen Roses, of different varieties, named, John L. Gardner, Silver Vase, value,	25 00
Six Roses, of any two varieties, three of each, named, John L. Gardner, Silver Vase, value,	15 00
Twelve Roses, of any four varieties, three of each, named, David Allan, Silver Vase, value,	20 00
Eighteen Roses, of any six varieties, three of each, named, John B. Moore & Son, Silver Vase, value,	25 00

Amateurs' Prize.

Twenty-four Roses, of different varieties, named, John L. Gardner, Silver Vase, value,	50 00

Society's Special Prizes.

HYBRID PERPETUAL ROSES. — Six blooms of Alfred Colomb, John B. Moore & Son,	4 00
Second, William H. Spooner,	3 00
Six blooms of Baroness Rothschild, the second prize to John B. Moore & Son,	3 00
Six blooms of Jean Liabaud, John B. Moore & Son,	4 00
Six blooms of John Hopper, " " "	4 00
Six blooms of Marquise de Castellane, John B. Moore & Son,	4 00
Second, David Allan,	3 00
Six blooms of Madame Gabriel Luizet, John B. Moore & Son,	4 00
Second, William H. Spooner,	3 00
Twelve blooms of any other variety, John B. Moore & Son,	6 00

Single bloom of any variety, John B. Moore & Son, François Michelon, ... $3 00
Second, David Allan, Merveille de Lyon, ... 2 00
Third, John L. Gardner, " " " 1 00

Regular Prizes.

Hardy Perpetual Roses. — Best six new varieties sent out since 1880, John B. Moore & Son, ... 5 00
Twenty-four distinct named varieties, three of each variety, John B. Moore & Son, ... 20 00
Twelve distinct named varieties, three of each variety, John B. Moore & Son, ... 10 00
Second, John S. Richards, ... 8 00
Third, " " 6 00
Six distinct named varieties, three of each variety, John S. Richards, ... 8 00
Three distinct named varieties, three of each variety, John S. Richards, ... 4 00
Moss Roses. — Six named varieties, three clusters of each, John B. Moore & Son, ... 6 00
Second, William H. Spooner, ... 4 00
Three named varieties, three clusters of each, John B. Moore & Son, ... 4 00
Hybrid Tea Roses. — Display in boxes, John S. Richards, . 6 00
Second, John S. Richards, ... 4 00
General Display of Hardy Roses, filling one hundred bottles, John B. Moore & Son, ... 10 00
Second, John S. Richards, ... 9 00
Third, William H. Spooner, ... 8 00
Fourth, C. M. Hovey, ... 7 00
Fifth, Benjamin G. Smith, ... 6 00
Stove and Greenhouse Flowering Plants. — Specimen Plant in bloom, named, other than Orchid, David Allan, *Erica Cavendishiana*, ... 6 00
Second, Frederick L. Ames, *Utricularia montana*, ... 4 00
Specimen Foliage or Flowering Plant, new and rare, other than Orchid, Frederick L. Ames, *Dichorisandra musaica*, . 4 00
Orchids. — Twelve plants, named varieties, in bloom, Frederick L. Ames, ... 18 00
Second, David Allan, ... 15 00
Six plants, named, Frederick L. Ames, ... 10 00
Second, E. W. Gilmore, ... 8 00
Three plants, named, E. W. Gilmore, ... 8 00
Herbaceous Pæonies. — Ten named varieties, the second prize to C. M. Hovey, ... 3 00
Sweet Williams. — Thirty trusses, not less than six distinct varieties, Edwin Sheppard & Son, ... 3 00
Second, Benjamin G. Smith, ... 2 00

Vase of Flowers. — Best arranged, in one of the Society's glass vases, Mrs. E. M. Gill,	$5 00
Second, Mrs. A. D. Wood,	4 00
Herbaceous Plants. — Miss Sarah W. Story,	2 00

Gratuities: —

F. Becker, Plants in Pots,	40 00
C. M. Hovey, Display of Plants,	25 00
W. A. Manda, Orchids and Ferns,	12 00
Frederick L. Ames, Orchids,	10 00
Samuel R. Payson, "	8 00
David Allan, Orchids and Ferns, and Cut Flowers,	8 00
" " Stove and Greenhouse Plants,	5 00
Mrs. Francis B. Hayes, Cut Roses,	5 00
Mrs. E. M. Gill, Display of Roses,	5 00
John S. Richards, Cut Roses,	2 00
C. M. Hovey, *Hydrangea Otaksa*, and Pelargoniums,	4 00
Edwin Sheppard, Delphiniums,	3 00
Mrs. Francis B. Hayes, Rhododendrons,	3 00
" " " " Clematis and Kalmias,	1 00
C. M. Hovey, Kalmias and Rhododendrons,	2 00
Robert Jackson, Pansies and Hardy Orchids,	2 00
C. M. Hovey, Pelargoniums,	2 00
John C. Hovey, Seedling Pæonies,	2 00
Miss Ellen M. Harris, "	1 00
Mrs. E. M. Gill, "	1 00
Benjamin G. Smith, Sweet Williams,	1 00
Joseph Tailby, Carnations,	1 00
Miss Sarah W. Story, Cut Flowers,	4 00
W. K. Wood, " "	5 00
Edwin Sheppard, " "	4 00
C. M. Hovey, " "	2 00
E. W. Gilmore, " "	2 00
Frederick L. Ames, " "	2 00
Mrs. P. D. Richards, Native Plants,	3 00

July 11.

Hybrid Perpetual Roses. — Twenty-four blooms of twenty-four distinct named varieties, John B. Moore & Son,	4 00
Delphiniums. — Six named varieties, Edwin Sheppard,	3 00
Second, Benjamin G. Smith,	2 00
Lilium Candidum. — Twelve spikes, Benjamin G. Smith,	3 00
Second, John L. Gardner,	2 00
Japan Iris — Varieties of *Iris Kæmpferi*. — Display, John L. Gardner,	6 00
Twelve named varieties, J. F. C. Hyde,	4 00

VASE OF FLOWERS. — Best arranged, in one of the Society's glass vases, Miss Sarah W. Story,	$3 00
Second, Mrs. E. M. Gill,	2 00
CUT FLOWERS. — Display, filling one hundred bottles, Mrs. E. M. Gill,	4 00
Second, W. K. Wood,	3 00
HERBACEOUS PLANTS. — Miss Sarah W. Story,	2 00
Second, A. McLaren,	1 00
Gratuities: —	
Joseph H. Woodford, Pansies,	1 00
C. M. Hovey, Native Rhododendrons,	1 00
Miss E. M. Harris, Lilies,	1 00
Miss Sarah W. Story, Cut Flowers,	1 00
Mrs. E. S. Joyce, " "	1 00
Edwin Fewkes, " "	1 00
Mrs. P. D. Richards, Native Plants,	1 00

JULY 18.

HOLLYHOCKS. — Twelve blooms, of twelve distinct colors, Edwin Sheppard,	4 00
Six blooms, of six distinct colors, Edwin Fewkes,	2 00
Second, John S. Richards,	1 00
Three blooms, of three distinct colors, Miss Ellen M. Harris,	1 00
CUT FLOWERS. — Display, filling one hundred bottles, C. M. Hovey,	4 00
Second, Mrs. E. M. Gill,	3 00
Third, W. K. Wood,	2 00
HERBACEOUS PLANTS. — A. McLaren,	2 00
Second, Miss S. W. Story,	1 00
Gratuities: —	
Edwin Sheppard, Hollyhocks,	2 00
Miss E. M. Harris, "	1 00
Edwin Fewkes, Tea Roses,	1 00
Miss Sarah W. Story, Cut Flowers,	2 00

JULY 25.

PELARGONIUMS. — Six double and six single varieties, named, one truss each, E. Sheppard & Son,	2 00
Second, C. M. Hovey,	1 00
PERENNIAL PHLOXES. — Six distinct named varieties, one spike each, Edwin Sheppard,	3 00
Second, John B. Moore & Son,	2 00
VERBENAS. — Thirty bottles, one truss in each, Adin A. Hixon,	3 00
Second, C. M. Hovey,	2 00
SWEET PEAS. — Display, filling twenty-five bottles, Edwin Fewkes,	3 00
Second, Mrs. E. M. Gill,	2 00

HERBACEOUS PLANTS. — Anthony McLaren,	$2 00
Second, Miss S. W. Story,	1 00
Gratuities: —	
W. S. Ward, Hollyhocks,	2 00
A. A. Hixon, Dwarf Nasturtiums,	1 00
" " Pelargoniums,	1 00
Edwin Sheppard, "	1 00
" " Phlox,	1 00
John B. Moore & Son, Hybrid Perpetual Roses,	1 00
Edwin Fewkes, Poppies,	1 00
Miss Sarah W. Story, Cut Flowers,	2 00
Mrs. E. M. Gill, " "	2 00
Mrs. P. D. Richards, Wild Flowers,	3 00

AUGUST 1.

BALSAMS. — Twelve spikes, not less than eight varieties, Edwin Sheppard,	200
CUT FLOWERS. — Display, filling one hundred bottles, Mrs. E. M. Gill,	4 00
Second, William K. Wood,	3 00
Third, C. M. Hovey,	2 00
NATIVE FERNS — Best display, Mrs. P. D. Richards,	3 00
HERBACEOUS PLANTS.— A. McLaren,	2 00
Second, Miss Sarah W. Story,	1 00
Gratuities:—	
John L. Gardner, two Hydrangeas,	3 00
John B. Moore & Son, Hybrid Perpetual Roses,	2 00
Denys Zirngiebel, Asters,	1 00
Edwin Fewkes, Poppies,	1 00
Edwin Sheppard, Balsams,	1 00
Mrs. P. D. Richards, Native Flowers,	1 00

AUGUST 7.

PERENNIAL PHLOXES.—Ten distinct named varieties, one spike each, John B. Moore & Son,	3 00
Second, Edwin Sheppard,	2 00
PETUNIAS.— Collection, filling thirty bottles, one spray in each, A. A. Hixon,	3 00
Second, John Parker,	2 00
Third, A. A. Hixon,	1 00
CUT FLOWERS.— Display, filling one hundred bottles, Mrs. E. M. Gill,	4 00
NATIVE FLOWERS. — Collection, Mrs. P. D. Richards,	3 00
HERBACEOUS PLANTS. — Miss Sarah W. Story,	2 00
Second, Anthony McLaren,	1 00

Gratuities:—

John B. Moore & Son, Hybrid Perpetual Roses,	$2 00
A. A. Hixon, Petunias, Verbenas, and Sweet Peas,	2 00
Benjamin G. Smith, Roses and Phlox,	1 00
Edwin Sheppard, Cut Flowers,	1 00

AUGUST 15.

GLADIOLI.—Twenty named varieties, in spikes, James Cartwright,	10 00
Second, Mrs. T. L. Nelson,	8 00
Ten named varieties in spikes, the second prize to H. B. Watts,	4 00
Six " " " Mrs. T. L. Nelson,	5 00
Second, H. B. Watts,	3 00
Single spike, named, James Cartwright, Ambroise Verschaffelt,	1 00
Display of named or unnamed varieties, filling one hundred bottles, James Cartwright,	8 00
Second, H. B. Watts,	6 00
Third, Edwin Sheppard,	4 00
PHLOX DRUMMONDI.—Fifty bottles, not less than six varieties, L. W. Goodell,	2 00
Second, C. M. Hovey,	1 00
HERBACEOUS PLANTS.—Anthony McLaren,	2 00
Second, Miss Sarah W. Story,	1 00

Gratuities:—

John B. Moore & Son, Roses and Phloxes,	2 00
A. A. Hixon, Petunias, Verbenas, Sweet Peas, and Dahlias,	2 00
L. W. Goodell, Petunias and Verbenas,	1 00
George S. Tuttle, Pompon Dahlias,	1 00
Mrs A. D. Wood, Cut Flowers,	1 00
Mrs. E M. Gill, " "	1 00
Miss Sarah W. Story, " "	1 00
Edwin Fewkes, " "	1 00
Stillman S. Hovey, " "	1 00

AUGUST 22.

ASTERS.—Truffaut's Pæony Flowered, thirty blooms, not less than ten varieties, Edwin Sheppard,	5 00
Second, Warren Heustis,	4 00
Victoria Flowered, thirty blooms, not less than eight varieties, Edwin Sheppard,	5 00
Second, William Patterson,	4 00
Third, James Cartwright,	3 00
Pompon, thirty sprays, not less than six varieties, one spray in each bottle. L. W. Goodell,	4 00
Second, Edwin Sheppard,	3 00
BASKET OF FLOWERS.—Best arranged, James O'Brien,	2 00
Second, Miss Sarah W. Story,	1 00

HERBACEOUS PLANTS, — Anthony McLaren,	$2 00
Second, Miss Sarah W. Story,	1 00

Gratuities:—

James Cartwright, Display of Gladioli,	3 00
H. B. Watts, " "	2 00
W. K. Wood, Gladioli, Asters, and Roses,	2 00
E. H. Hitchings, Native Plants,	1 00
L. W. Goodell, Petunias and Balsams,	1 00
Edwin Fewkes, Dahlias, Zinnias, etc.,	1 00
Mrs. E. M. Gill, Asters,	1 00
James Cartwright, "	1 00
Edwin Sheppard, "	1 00
Mrs. Francis B. Hayes, Cut Flowers,	5 00
Miss Sarah W. Story, " "	1 00
Mrs. E. M. Gill, " "	1 00
C. M. Hovey, " "	1 00
Mrs. P. D. Richards, Wild Flowers,	2 00

AUGUST 29.

LILIUM LANCIFOLIUM. — Twelve spikes, the second prize to Miss Sarah W. Story,	2 00
TROPÆOLUMS. — Display, filling twenty-five bottles, the third prize to H. B. Watts,	1 00
MARIGOLDS. — Twenty-five bottles, three flowers in each, Stillman S. Hovey,	3 00
Second, William K. Wood,	2 00
Third, Mrs. E. M. Gill,	1 00
SINGLE DAHLIAS. — Twenty-four bottles, one spray in each, the second prize to Edwin Sheppard,	2 00
HERBACEOUS PLANTS. — Miss Sarah W. Story,	2 00
Second, Anthony McLaren,	1 00

Gratuities:—

James Cartwright, Gladioli,	2 00
V. H. Hallock, Son, & Thorpe, Gladioli,	1 00
H. B. Watts, "	1 00
George S. Tuttle, Dahlias,	1 00
Edwin Fewkes, "	1 00
" " Phlox,	1 00
" " Cut Flowers,	1 00
A. A. Hixon, " "	1 00
John Parker, " "	1 00
Mrs. Francis B. Hayes, Cut Flowers,	1 00
Miss Sarah W. Story, " "	1 00
Mrs. E. M. Gill, " "	1 00
Edwin Sheppard, " "	1 00

Stillman S. Hovey, Cut Flowers,	$1 00
William K. Wood, " "	1 00
Mrs. P. D. Richards, Wild Flowers,	1 00

SEPTEMBER 5.

DOUBLE ZINNIAS. — Twenty-five flowers, not less than six varieties, Edwin Sheppard,	3 00
Second, Edwin Fewkes,	2 00
Third, L. W. Goodell,	1 00
DIANTHUS — Annual and Biennial varieties. — Collection, filling fifty boxes, single trusses, L. W. Goodell,	4 00
Second, H. B. Watts,	3 00
CUT FLOWERS.— Display, filling one hundred bottles, Mrs. E. M. Gill,	4 00
Second, William K. Wood,	3 00
Third, A. A. Hixon,	2 00
HERBACEOUS PLANTS.— Miss Sarah W. Story,	2 00
Second, Anthony McLaren,	1 00

Gratuities: —

James Cartwright, Gladioli,	2 00
H. B. Watts, "	2 00
L. W. Goodell, Petunias,	1 00
A. A. Hixon, "	1 00
W. C. Strong, Foliage of seventeen varieties of Maples,	1 00
Mrs. Francis B. Hayes, Rhododendrons,	1 00
Edwin Sheppard, Dianthus,	1 00
George S. Tuttle, Pompon Dahlias,	1 00
John Parker, Dahlias,	1 00
Edwin Fewkes, "	1 00
Mrs. Francis B. Hayes, Cut Flowers,	1 00
Stillman S. Hovey, " "	2 00
Edwin Fewkes, " "	1 00
Edwin Sheppard, " "	1 00
Miss Sarah W. Story, " "	1 00
C. M. Hovey, " "	1 00
William J. Martin, " "	1 00
John Parker, " "	1 00
Mrs. P. D. Richards, Native Plants,	1 00

ANNUAL EXHIBITION.

SEPTEMBER 16, 17, 18 AND 19.

Hunnewell Premiums.

EVERGREEN TREES AND SHRUBS.— Display in pots of other than Native Evergreens of New England, named, William C. Strong,	$8 00
Second, J. W. Manning,	6 00

Society's Prizes.

GREENHOUSE PLANTS. — Twelve Greenhouse and Stove Plants, of different named varieties, one Dracæna and one Croton admissible, H. H. Hunnewell,	$40 00
Second, Samuel R. Payson,	30 00
Third, David Allan,	25 00
Fourth, C. H. Hovey & Co.,	20 00
SPECIMEN FLOWERING PLANTS. — Six named varieties, in bloom, David Allan,	15 00
Single named specimen, David Allan, *Anthurium Andreanum*,	5 00
Second, Frederick L. Ames, " "	4 00
Third, David Allan, *Grevillea Preissii*,	3 00
VARIEGATED LEAVED PLANTS. — Six named varieties, not offered in the collection of greenhouse plants, Crotons and Dracænas not admissible, H. H. Hunnewell,	12 00
Second, Frederick L. Ames,	10 00
Third, Samuel R. Payson,	8 00
Single specimen, named, not offered in any collection, G. A. Nickerson, Croton Queen Victoria,	5 00
Second, John L. Gardner. *Eurya latifolia variegata*,	4 00
CALADIUMS. — Four named varieties, Frederick L. Ames,	5 00
Second, David Allan,	4 00
FERNS — Six named varieties, no Adiantums admissible, Frederick L. Ames,	8 00
Second, David Allan,	6 00
ADIANTUMS. — Six named varieties, David Allan,	6 00
Second, Samuel R. Payson,	4 00
TREE FERN. — Single specimen, named, David Allan,	6 00
Second, G. A. Nickerson,	4 00
LYCOPODS. — Four named varieties, David Allan,	3 00
DRACÆNAS. — Six named varieties, H. H. Hunnewell,	8 00
Second, E. W. Gilmore,	6 00
CROTONS. — Six named varieties, in not exceeding six-inch pots, Frederick L. Ames,	6 00
Second, E. W. Gilmore,	4 00
Third, David Allan,	3 00
PALM. — Single specimen, named, Samuel R. Payson, *Cocos Bonnetti*,	6 00
Second, C. H. Hovey & Co., *Pritchardia Pacifica*,	5 00
NEPENTHES. — Three plants, named, Frederick L. Ames,	6 00
AGAVES. — Six distinct named varieties, C. M. Hovey,	4 00
Second, Benjamin G. Smith,	3 00
SUCCULENTS. — Collection (other than Agaves or Yuccas) of twelve named species and varieties, C. M. Hovey,	4 00
ORCHIDS. — Six plants, named varieties, in bloom, Frederick L. Ames.	12 00

Three plants, named varieties, in bloom. E. W. Gilmore. . .	$8 00
Second. Frederick L. Ames.	6 00
Single plant, in bloom Frederick L. Ames, *Epidendrum prismatocarpum*, ...	3 00
GLADIOLI.— Best display, and best kept during the exhibition, of named or unnamed varieties, filling one hundred bottles, H. B. Watts.	10 00
Second. James Cartwright, ...	8 00
Third. Edwin Sheppard.	6 00
DAHLIAS.— Twelve named varieties. Edwin Sheppard. . .	6 00
Second. C. L. Burr.	5 00
Six named varieties. Edwin Sheppard, ...	4 00
Second. John Parker.	3 00
Third. Macey Randall.	2 00
Three named varieties. Edwin Sheppard.	3 00
Single named flower, fancy or self. Edwin Sheppard. . .	2 00
LILIPUTIAN DAHLIAS. — General Display, filling twenty-five bottles. George S. Tuttle.	3 00
Second, Macey Randall.	2 00
Third. Charles L. Burr.	1 00
CUT FLOWERS — Best Display, and best kept during the exhibition, filling one hundred and fifty bottles. Mrs. E. M. Gill. .	16 00
Second. C. H. Hovey & Co., ...	14 00
Third, W. K. Wood, ...	12 00
BASKET OF FLOWERS. — Best arranged, and best kept through the exhibition. James O'Brien, ...	6 00
Second. Mrs. David Allan, ...	5 00
Third. Miss Sarah W. Story, ...	4 00

Gratuities: —

William J. Martin (gardener to Henry P. Kidder). Greenhouse and Stove Plants.	25 00
H. H. Hunnewell. twenty-two Stove and Greenhouse Plants, and Cut Flowers.	15 00
Frederick L. Ames. thirteen Stove and Greenhouse Plants, . .	10 00
G. A. Nickerson. Crotons. Dracænas. and Palms, sixteen plants, .	10 00
Robert. T. Jackson. Hardy Plants and Evergreens in pots. . .	3 00
Samuel R. Payson. Plants, ...	2 00
Frederick L. Ames, " and Cut Flowers, ...	3 00
E. W. Gilmore. " " " "	2 00
Edwin Fewkes. Dahlias, Sweet Peas, etc., ...	2 00
John Parker. " etc..	1 00
Macey Randall. "	2 00
Charles L. Burr, "	2 00
Edwin Sheppard. "	1 00
E. W. Sewall. Nasturtiums (twenty-eight varieties), ...	1 00
J. S. Johnson. "	1 00

C. M. Hovey, Ferns,	$2 00
" " " in Lower Hall,	2 00
Stillman S. Hovey, Asters and Marigolds,	2 00
Robert T. Jackson, "	2 00
Miss Sarah W. Story, Herbaceous Plants,	1 00
W. C. Strong, Foliage of Trees and Shrubs,	3 00
Norton Brothers, Roses,	1 00
L. W. Goodell, Cut Flowers,	3 00
John S. Richards, " "	2 00
Mrs. Francis B. Hayes, " "	1 00
Miss Emilie Ropes, " "	1 00
Miss Sarah W. Story, " "	1 00
Edwin Sheppard, " "	1 00
N. S. Simpkins, twelve cut Nymphæas,	2 00
E. D. Sturtevant, Nelumbiums and Nymphæas,	50 00
Frank H. Forbes, Bouquet of Foliage and Wild Flowers,	1 00
Mrs. P. D. Richards, Native Plants,	2 00

OCTOBER 3.

Gratuities: —

Edwin Sheppard. Single and Double Dahlias,	3 00
C. M. Hovey, Single Dahlias,	2 00
John L. Gardner, Dahlias,	2 00
John Parker, "	1 00
Stillman S. Hovey, Marigolds and Dahlias,	1 00
Miss Sarah W. Story, Cut Flowers,	2 00
Mrs. E. M. Gill, " "	1 00
Mrs. T. L. Nelson, " "	1 00
Mrs. P. D. Richards, Wild Flowers,	2 00

NOVEMBER 7.

Gratuity: —

John C. Hovey, Plant of *Helleborus niger*.	2 00

CHRYSANTHEMUM SHOW.

NOVEMBER 12 AND 13.

CHRYSANTHEMUMS. — Six Large Flowered or Chinese, distinct named varieties, one plant in each pot. Henry P. Walcott,	$12 00
Three Large Flowered or Chinese, distinct named varieties, one plant in each pot, Henry P. Walcott,	8 00
Second, Edwin Fewkes,	6 00
Six Japanese, distinct named varieties, one plant in each pot, Henry P. Walcott,	12 00
Second, Edwin Fewkes,	10 00

Three Japanese, distinct named varieties, one plant in each pot, Henry P. Walcott,	$8 00
Second, Henry P. Walcott,	6 00
Third, Edwin Fewkes,	4 00
Four Pompons, distinct named varieties, one plant in each pot, Henry P. Walcott,	8 00
Specimen Plant, Large Flowered or Chinese, named, Henry P. Walcott, Mr. Gladstone,	5 00
Second, Edwin Fewkes, Mr. George Glenny,	4 00
Specimen Plant, Japanese, named, Henry P. Walcott. Fernand Feral,	5 00
Second, Edwin Fewkes, Carmen,	4 00
Specimen Plant, Anemone, named, Henry P. Walcott. Timbale d'Argent,	5 00
Best display of forty named plants, in pots, all classes, not less than ten varieties, E. W. Wood,	25 00
Second, Edwin Fewkes,	20 00
Third, Patrick Malley,	18 00
Twelve cut blooms, Large Flowered or Chinese, named, Edwin Fewkes,	5 00
Second, Edwin Sheppard,	4 00
Twelve cut blooms, Japanese, named, Edwin Sheppard,	5 00
Second, Edwin Fewkes,	4 00
Six cut blooms, Large Flowered or Chinese, named, Edwin Fewkes,	4 00
Second, Samuel Neil,	3 00
Six cut blooms, Japanese, named, Edwin Fewkes,	4 00
Second, George W. Creesy,	3 00
Display of twenty-four sprays, not less than twelve varieties, Large Flowered or Chinese, named, in vases, Edwin Fewkes,	5 00
Second, E. W. Wood,	4 00
Third, Edwin Sheppard,	3 00
Fourth, Samuel Neil,	2 00
Display of twenty-four sprays, not less than twelve varieties, Japanese, named, in vases, Edwin Fewkes,	5 00
Second, Edwin Sheppard,	4 00
Third, E. W. Wood,	3 00
Fourth, C. M. Hovey,	2 00
Display of twenty-four sprays, not less than twelve varieties, Pompons, named, in vases, E. W. Wood,	4 00
ORCHIDS.— Three plants, named varieties, in bloom, Frederick L. Ames,	10 00
Second, E. W. Gilmore,	8 00
Third, Frederick L. Ames,	6 00
Fourth, E. W. Gilmore,	4 00

Single plant, in bloom, David Allan, *Vanda cærulea*, . .	$5 00
Second, Frederick L. Ames, *Cypripedium Harrisianum* . .	4 00
Third, E. W. Gilmore, ...	3 00

Gratuities: —

Mrs. Francis B. Hayes, Display of Chrysanthemums, . . .	12 00
Norton Brothers, " " . . .	12 00
C. M. Hovey, " " . . .	8 00
Henry P. Walcott, three Seedling " in pots, .	5 00
Edwin Fewkes, seven " " " .	5 00
Patten & Co., Collection of " " cut blooms,	4 00
Warren Heustis, Ten Chrysanthemums, in pots, ...	4 00
J. Lewis Childs, Cut "	3 00
Henry P. Walcott, " "	2 00
Mrs. E. M. Gill, " "	3 00
Edwin Sheppard, " " and Pelargoniums, etc., .	5 00
C. M. Hovey, Greenhouse Plants, ...	15 00
W. A. Manda, " " cut blooms of, ...	3 00
" " Collection of Orchids.	7 00
David Allan, " " " and Cut Flowers, . .	8 00
Frederick L. Ames, " " " " " . .	6 00
E. W. Gilmore, " " " " " . .	6 00
Sewall Fisher, " " Seedling Carnations, . . .	3 00
Robert Manning, Snowberry, Coralberry, and Bittersweet. . .	1 00
Miss Sarah W. Story, Cut Flowers, ...	3 00
Stillman S. Hovey, " "	3 00
Mrs. E. M. Gill, Design, ...	1 00
Mrs. F. W. Webber, " in Immortelles, ...	1 00
Mrs. Stillman S. Hovey, Basket of Dried Flowers, . . .	2 00
Mrs. P. D. Richards, Native Flowers and Shrubs, . . .	4 00

DECEMBER 5.

Gratuities: —

Edwin Sheppard, Pelargoniums, ...	1 00
Mrs. Francis B. Hayes, Cut Flowers, ...	1 00
Mrs. E. M. Gill, " "	1 00

DECEMBER 19.

Gratuities: —

Mrs. Francis B. Hayes, Cut Flowers, ...	1 00
Mrs. P. D. Richards, Native Plants, ...	2 00

SILVER MEDALS.

January 24. Samuel R. Payson, *Cattleya labiata Percivaliana.*

" 28. Frederick L. Ames, Five-flowered spike of *Vanda Sanderiana.*

Spring Exhibition, March 19 and 20. Frederick L. Ames, *Phalænopsis Brymerianum*.
" " " " F. L. Harris (gardener to H. H. Hunnewell), for skilful culture of Orchids.
" " " " William Robinson (gardener to F. L. Ames), for skilful culture of Orchids.
" " " " David Allan (gardener to R. M. Pratt), for skilful culture of Orchids.
June 20. Mrs. Francis B. Hayes, for New Rhododendrons in 1885.
August 22. N. S. Simpkins, for skill shown in cultivating *Nymphæa rubra*, *N. Deroniensis*, *N. Zanzibarensis aurea*, *N. dentata*, etc.
Annual Exhibition, Sept. 15–18. David Allan, *Alocasia Sanderiana*.
" " " " H. H. Hunnewell, *Asparagus plumosus scandens*.
Chrysanthemum Show, Nov. 12 and 13. Henry P. Walcott, Seedling yellow Chrysanthemum B 25.
December 5. Miss S. W. Story, for Herbaceous Plants during the season of 1885.

BRONZE MEDALS.

February 28. E. M. Wood & Co., sixteen Maréchal Niel Roses; and for cultural skill.
December 5. Anthony McLaren, for Herbaceous Plants during the season of 1885.

FIRST CLASS CERTIFICATES OF MERIT.

January 24. Samuel R. Payson, six varieties of *Cattleya Trianæ*.
" 28. C. M. Hovey, Seedling Amaryllis.
February 28. Edward L. Beard, *Primula obconica*.
" 28. William H. Spooner, Hybrid Perpetual Rose Queen of Queens.
Spring Exhibition, March 19 and 20. John B. Moore & Son, New Rose Col. Felix Breton.
" " " " Edward L. Beard, Narcissus Sir Watkins.
March 28. David Allan, Double Clematis Maggie Mitchell.
April 11. Frederick L. Ames, *Lælia Philbrickiana*.
August 1. F. L. Temple, *Hypericum aureum*.
" 1. " " *Gaillardia grandiflora*.
" 1. Arthur H. Fewkes, *Milla biflora*.
" 1. John C. Hovey, *Orostachys spinosa*.

August 7. William J. Martin, gardener to Henry P. Kidder, for skill in cultivating Achimenes.

" 15. Denys Zirngiebel, eight pots of Dwarf French Asters.

September 5. Joseph Tailby, Rose William Francis Bennett.

" 5. C. M. Hovey, " Perle d' Or.

" 5. Edwin Fewkes, Heliotrope Roi des Noirs.

Annual Exhibition, September 15–18. Frederick L. Ames, *Dracæna Massangeana.*

" " " " H. H. Hunnewell, *Dracæna Massangeana.*

" " " " Frederick L. Ames, *Ataccia cristata.*

Chrysanthemum Show, November 12, 13. Henry P. Walcott, Seedling yellow Chrysanthemum C 10.

" " " " Henry P. Walcott, Seedling yellow Chrysanthemum C 56.

" " " " Frederick L. Ames, *Cypripedium tonsum*, *C. tesselatum*, and *C. porphyreum.*

REPORT

OF THE

COMMITTEE ON FRUITS,

FOR THE YEAR 1885.

By E. W. WOOD, Chairman.

The fruit crop of the past year throughout the State has been above the average. A marked feature has been the large excess of Apples over the amount usually produced in the odd year. In many orchards in the State the crop of 1884 was destroyed by late frosts in the spring, and those orchards have borne a full crop the past season, thus very nearly equalizing the yield of these two years. Though the owners lost the crop of 1884, they have been partly recompensed, and will receive a further substantial benefit if the trees continue to produce their fruit on the odd year. In that case, our State will be amply able to furnish an annual home supply of this fruit, instead of, as now, depending upon other portions of the country in alternate years, which will be a decided gain to both producer and consumer. The supply the past season has been beyond the demand for home consumption; and from ten to twenty thousand barrels per week have been sent to foreign markets. The prices have been reasonable for consumers and fairly remunerative to the growers.

The fruit buds on the Peach trees were again destroyed the last winter. This occurred about the 20th of December, 1884, when there had been no extremely low temperature; but immediately after several successive days of cold west wind it was discovered that the buds were all killed. From this it appears that such a result does not depend altogether upon extreme cold; but may

occur from other conditions of the atmosphere. Neither the health nor vigor of the trees seems to be seriously affected, as they have made fair growth the past season, and are again well furnished with fruit buds.

Strawberries. — The crop of this fruit was above the average, and the exhibition more than usually interesting. Of the special prizes for the best four quarts of any variety, the first and second were awarded for the Sharpless; the third, for one of several new seedlings introduced by P. M. Augur & Sons, of Middlefield, Conn., called the Jewell. This variety compares more favorably with the Sharpless in size than any previously shown, and the Committee thought it better in quality; and from plants shown with the fruit it would seem to be unusually productive. It is an exceedingly strong grower, producing runners of unusual size. The fourth prize was taken by Warren Heustis, for his seedling Belmont; which fully sustained the recommendations previously given in these reports. As a late variety for market it is specially desirable. For the best seedling introduced since 1880, the Society's Silver Medal was awarded to P. M. Augur & Sons for the Jewell. For one quart of any new variety not previously exhibited, the first prize was awarded to Messrs. Augur & Sons for the Dewey; which was of fair size, good form and color, and superior in quality to any other of the new varieties shown. The second prize was awarded to W. C. Winter for the Lincoln.

There have been the usual displays of other small fruits at the weekly exhibitions; though there has been nothing new entitled to special mention.

Currants have been shown in about the usual quantity. All the open prizes for Red varieties have been taken by the Versaillaise; and the prizes for White were divided between the French Transparent and Dana's Transparent.

Cherries were exhibited in less quantity than for several years. That this fruit is less reliable and less profitable than some of the others is shown by the fact that the larger growers give it comparatively little attention, devoting their time and space to other fruits.

Raspberries were shown in about the usual quantity. The Cuthbert took the lead as a prize winner; this variety seems to have been generally adopted by the growers. This fruit deserves more

attention; it is easily grown, and meets with ready sale at fairly remunerative prices.

Blackberries. — The prizes for this fruit were all awarded to the Dorchester. While this variety has proved the most desirable for exhibition purposes, there are others equally if not more desirable for general cultivation. It is claimed for the Kittatinny that it is more hardy, a good cropper, and produces good-sized, saleable fruit.

Gooseberries were shown in limited quantity. They are grown to less extent than any other of the small fruits. The prizes were given to the Downing and Smith's Improved, for Natives; and to the Whitesmith and Bang-Up, for Foreign.

Plums were shown in large quantity and variety, forming an interesting feature of the weekly and annual exhibitions. The most serious obstacle to growing this fruit is the black wart; and the only remedy for this disease, thus far discovered, is cutting it out immediately upon its appearance, — a process which often disfigures and not unfrequently destroys valuable trees.

Peaches. — The frequent failure of this fruit within the last few years has discouraged the larger growers; and, at least for the immediate future, its cultivation will be confined mostly to the private garden, where a few trees may be planted every year. The fact that this fruit is now frequently destroyed by winters less severe than it endured in former years, when abundant crops were produced, would indicate that the trees have become less vigorous and hardy. Whether any improvement can be secured by greater care in selecting pits and buds from healthy trees, is a subject worthy of consideration.

Grapes. — It has been an exceptionally favorable season for this fruit. There has been very little mildew, and the continued mild weather in October gave plenty of time to ripen and gather the crop. The competition for the prizes has been larger than for several years; and the specimens exhibited have been of superior quality.

Foreign Grapes. — The display of this fruit at the annual exhibition by David Allan was the finest that has ever come under the examination of the present Committee. The size, color, and finish of some of the bunches have rarely if ever been equalled at any previous exhibitions of the Society.

PEARS have been abundant, and the exhibitions have been well sustained through the season; and the competition on some of the more popular varieties has been so great that the Committee have been unable to recognize properly all that were offered. There have been some complaints among growers at the prices realized; but those who have had well-grown fruit of such varieties as the trade demanded, when they compare the prices with those of other articles, either of luxury or necessity, have little cause for complaint. The opportunity supplied by the cold-storage houses for extending the season of some of the earlier pears has been of great advantage to the growers. All the better varieties of October pears could be furnished in perfect condition for the Thanksgiving dinner.

APPLES. — As already stated above, there has not, certainly for many years, been so large a crop of apples on the odd year as was gathered the past season. At this year's Annual Exhibition, for the first time in the history of our Society, the prizes offered for this fruit were nearly all awarded.

In addition to the displays at regular exhibitions, specimens have been received and placed upon the tables in the Library Room, for exhibition, as follows: —

A. L. Hitchcock sent a cluster of Grape Fruit received from Florida, resembling Shaddocks, but growing in clusters. This is the *Citrus pompelmos racemosus* of Risso and Poiteau.

There were received from the Maine Pomological Society forty-three varieties of Apples, comprising the most popular kinds grown in that State, many of which were familiar to and are grown by our own exhibitors.

A collection of Apples was received, through Hon. Marshall P. Wilder, from Nebraska. They were very smooth and fair, and of large size; but hardly in condition to afford a fair test of quality.

A dish of Seedling Apples was received from John F. Jones, Contoocook, N.H. They were of large size, perfect form, and a deep bright red color throughout; of fair quality, and would make a very attractive market variety.

Of fruits previously entered for the Prospective Prizes, the Hayes Grape and the Belmont Strawberry were the only ones to which the attention of the Committee has been called. P. M.

Augur & Sons have this year entered their Seedling Strawberry, Jewell, for the Prospective Prize for that fruit.

Of the $1,500 appropriated for prizes and gratuities for fruits, the Committee have awarded $1,225, leaving a balance of $275. A considerable portion of this balance represents prizes offered for peaches, but not awarded, owing to the failure of the crop, and the consequent absence of competition.

The increased appropriation for next year has enabled the Committee to offer new prizes; and also to add materially to the old ones, especially for those fruits in which there is the strongest competition; and they feel confident that these measures will result in an accession of new exhibitors, and in more assiduous efforts on the part of our habitual contributors, thus making our exhibitions what they should be,— sources of continually increasing interest and instruction.

E. W. Wood,
Benj. G. Smith,
Jacob W. Manning,
C. F. Curtis,
O. B. Hadwen,
Warren Fenno,
} *Committee on Fruits.*

PREMIUMS AND GRATUITIES AWARDED FOR FRUITS.

February 21.

Gratuity:—

Asa Clement, Lady's Sweet Apples,	$1 00

SPRING EXHIBITION.

March 19 and 20.

Winter Pears.—A. J. Bigelow, Anjou,	$3 00
Second, Mary Gardner, Easter Beurre,	2 00
Winter Apples.—William T. Hall, Northern Spy,	3 00
Second, C. Terry, Baldwin,	2 00
Strawberries.—One pint, T. N. Vail, Sharpless,	3 00

Gratuities:—

C. C. Balch, Lemons and Oranges,	2 00
A. S. McIntosh, Apples and Pears,	2 00
Mrs. H. V. Draper, Pears,	1 00
Robert Manning, "	1 00
C. Sumner Jacobs, Apples,	1 00
B G. Smith, Collection,	2 00
C. W. Grant, "	1 00
Warren Fenno, "	1 00

April 4.

Gratuity:—

T. N. Vail, Sharpless Strawberries,	2 00

April 18.

Gratuity:—

William H. Hunt, Hunt Russet Apples,	1 00

May 9.

Gratuity:—

George Hill, Sharpless Strawberries,	1 00

June 13.

Gratuity:—

O. B. Hadwen, Apples,	1 00

JUNE 20.

Gratuities: —

Asa Clement, Apples,		$1 00
William Doran & Son, Strawberries.		1 00
John B. Moore & Son,	"	1 00
C. E. Grant.	"	1 00
George Hill.	"	1 00

ROSE AND STRAWBERRY EXHIBITION.

JUNE 25 AND 26.

Special Prizes.

STRAWBERRIES.— Four quarts of any variety, George Hill, Sharpless, Silver Cup, value,	$20 00
Second, George V. Fletcher, Sharpless,	15 00
Third, P. M. Augur & Sons, Jewell,	10 00
Fourth, Warren Heustis, Belmont,	5 00

Best Exhibition of a Seedling Strawberry introduced within the last five years, P. M. Augur & Sons, Jewell, Silver Medal.

Regular Prizes.

STRAWBERRIES.— Forty-eight berries of Bidwell, George V. Fletcher,	4 00
Second, William Patterson,	3 00
Charles Downing, E. W. Wood,	4 00
Second, C. M. Hovey,	3 00
Third, Joseph D. Fitts,	2 00
Cumberland, Benjamin G. Smith.	4 00
Second, J. D. Fitts,	3 00
Hervey Davis, E. W. Wood,	4 00
Second, John B. Moore & Son,	3 00
Third, B. G. Smith,	2 00
Hovey, the third prize to C. M. Hovey,	2 00
Jucunda, C. E. Grant,	4 00
Miner's Prolific, the second prize to J. D. Fitts,	3 00
Seth Boyden, the second prize to E. W. Wood.	3 00
Sharpless, George Hill,	4 00
Second, John B. Moore & Son,	3 00
Twenty-four berries of Bidwell, the second prize to J. D. Fitts,	2 00
Champion, the second prize to J. D. Fitts,	2 00
Charles Downing, E. W. Wood,	3 00
Second, B. G. Smith,	2 00
Crescent, B. Judkins,	3 00
Second, L. W. Weston,	2 00
Cumberland, William Patterson,	3 00
Second, Warren Heustis,	2 00

Hervey Davis, E. W. Wood,	$3 00
Second, John B. Moore & Son,	2 00
Jersey Queen, C. M. Hovey,	3 00
Second, J. D. Fitts,	2 00
Manchester, Warren Heustis,	3 00
Second, J. D. Fitts,	2 00
Miner's Prolific, the second prize to L. W. Weston,	2 00
Seth Boyden, E. W. Wood,	3 00
Sharpless, George Hill,	3 00
Second, William Patterson,	2 00
Any other variety, C. E. Grant, Longfellow,	3 00
Second, William C. Winter, Seedling No. 10,	2 00
Third, John L. Gardner, James Vick,	1 00
Collection, not less than six varieties, J. D. Fitts,	4 00
One quart of any new variety, P. M. Angur & Sons, Dewey,	3 00
Second, William C. Winter, Lincoln,	2 00
CHERRIES.— Two quarts of any variety, S. Lockwood, Black Tartarian,	2 00
FOREIGN GRAPES.— Two bunches of any variety, E. S. Converse, Black Hamburg,	5 00
FORCED PEACHES.— Six specimens of any variety, William C. Winter,	3 00

Gratuities:—

E. S. Converse, Foreign Grapes,	2 00
C. E. Grant, Strawberries,	2 00

JULY 11.

STRAWBERRIES.— Twenty-four berries of any variety, Warren Heustis, Belmont,	3 00
Second, C. E. Grant, Longfellow,	2 00
Third, Warren Heustis, Middlesex,	1 00
CHERRIES.— Two quarts of Downer's Late, M. W. Chadbourne,	2 00
Second, C. N. Brackett,	1 00
Any other variety, Warren Fenno, Norfolk,	2 00
RASPBERRIES.— Two quarts of any variety, C. E. Grant, Herstine,	3 00
Second, William Doran & Son, Highland Hardy,	2 00
CURRANTS.— Forty-eight bunches of any Red variety, B. G. Smith, Versaillaise,	4 00
Second, M. W. Chadbourne, Versaillaise,	3 00
Third, William Doran & Son, "	2 00

Gratuities:—

S. Lockwood, Cherries,	2 00
M. W. Chadbourne, Collection,	1 00

July 18.

Raspberries.— Collection of not less than four varieties, two quarts of each, William Doran & Son,	$4 00
Second, C. E. Grant,	3 00
Two quarts of any variety, John B. Moore & Son, Souchetti.	3 00
Second, B. Judkins, Cuthbert,	2 00
Currants.— Twenty-four bunches of Versaillaise, B. G. Smith,	2 00
Second, W. K. Wood,	1 00
Any other Red variety, B. G. Smith, Fay's Prolific,	2 00
Second, B. G. Smith, Victoria,	1 00

Gratuities:—

C. E. Grant, Strawberries,	1 00
Warren Heustis, "	1 00
C. N. Brackett, Cherries,	1 00
S. Lockwood, "	1 00
Warren Fenno, "	1 00

July 25.

Raspberries.— Two quarts of any variety, C. E. Grant, Cuthbert,	2 00
Second, B. Judkins, Cuthbert,	1 00
Currants.— Twenty-four bunches of any Red variety, B. G. Smith, Versaillaise,	3 00
Second, Mrs. E. M. Gill, Versaillaise,	2 00
Third, W. K. Wood, "	1 00
Any White variety, B. G. Smith, Dana's Transparent,	2 00
Second, B. G. Smith, French Transparent,	1 00
Gooseberries.— Two quarts of any Native variety, M. W. Chadbourne, Downing,	3 00
Second, B. G. Smith, Smith's Improved,	2 00

Gratuities:—

M. W. Chadbourne, Currants,	1 00
Warren Heustis, "	1 00
Warren Fenno. Gooseberries,	1 00
C. E. Grant. Raspberries,	1 00

August 1.

Blackberries.— Two quarts of any variety, A. S. McIntosh, Dorchester,	3 00
Second, M. W. Chadbourne, Dorchester.	2 00
Third, L. W. Weston, "	1 00
Gooseberries.— Two quarts of Foreign, B. G. Smith, Whitesmith,	2 00
Second, B. G. Smith, Bang-Up,	1 00

PEARS.— Summer Doyenne, Horace Eaton,	$3 00
Second, Warren Fenno,	2 00
Third, B. G. Smith,	1 00
Any other variety, A. S. McIntosh, Madeleine,	3 00
Second, A. W. Nelson, "	2 00
Third, Warren Fenno, "	1 00

Gratuities :—

C. E. Grant, Raspberries,	1 00
Warren Fenno, Gooseberries,	2 00
M. W. Chadbourne, " and Currants,	1 00
Marshall P. Wilder, Seedling Gooseberry,	1 00

AUGUST 8.

APPLES.— Sweet Bough, Warren Heustis,	2 00
Second, Warren Fenno,	1 00
Any other variety, Charles F. Curtis, Williams,	2 00
Warren Fenno, Red Astrachan,	1 00
PEARS.— Giffard, John L. Bird,	3 00
Second, Charles F. Curtis,	2 00
Third, B. G. Smith,	1 00
Any other variety, B. G. Smith, Jargonelle,	2 00
Second, M. W. Chadbourne, Osband's Summer,	1 00

Gratuities :—

B. G. Smith, Gooseberries and Blackberries,	1 00
A. S. McIntosh, Blackberries,	1 00
B. C. Vose, "	1 00
M. W. Chadbourne, Collection,	1 00
C. E. Grant, "	1 00

AUGUST 15.

APPLES.— Oldenburg, C. C. Shaw,	3 00
Second, Warren Fenno,	2 00
Red Astrachan, C. C. Shaw,	3 00
Second, Horace Eaton,	2 00
Third, Warren Fenno,	1 00
Williams, Charles F. Curtis,	3 00
Second, Asa Clement,	2 00
Third, Josiah Crosby,	1 00
PEARS.— Clapp's Favorite, Horace Eaton,	3 00
Second, John L. Bird,	2 00
Third, C. S. Hosmer,	1 00
Manning's Elizabeth, Mrs. Mary Langmaid,	2 00
Second, Warren Fenno,	1 00
Any other variety, George Frost, Quimper,	2 00
Second, C. N. Brackett, Brandywine,	1 00

FOREIGN GRAPES.—Two bunches of any variety, David Allan, Black Hamburg,	$5 00
Second, John S. Farlow, Cannon Hall Muscat,	4 00
Gratuity:—	
Warren Fenno, Collection,	1 00

AUGUST 22.

PEARS.—Bartlett, George S. Harwood,	3 00
Second, Samuel Hartwell,	2 00
Third, C. N. Brackett,	1 00
Rostiezer, George S. Harwood,	2 00
Second, C. N. Brackett,	1 00
Tyson, A. S. McIntosh,	2 00
Second, Samuel McIntosh,	1 00
Any other variety, C. M. Hovey, Clapp's Favorite,	2 00
Second, Warren Heustis, " "	1 00
PEACHES.—Any variety, Warren Fenno, Hale's Early,	3 00
Gratuities:—	
Warren Fenno, Pears and Apples,	2 00
M. W. Chadbourne, Pears,	1 00
A. S. McIntosh, "	1 00

AUGUST 29.

APPLES.—Any variety, Samuel Hartwell, Williams,	3 00
Second, B. G. Smith, "	2 00
Third, Warren Heustis,	1 00
PEARS.—Bartlett, George S. Harwood,	3 00
Second, Mrs. A. M. Winn,	2 00
Third, Samuel Hartwell,	1 00
Any other variety, A. McDermott, Clapp's Favorite,	2 00
Second, A. S. McIntosh, Tyson,	1 00
PLUMS.—Any variety, John B. Moore & Son, Washington,	3 00
Second, Samuel Hartwell, Niagara,	2 00
Third, B. G. Smith, Bradshaw,	1 00
NATIVE GRAPES.—Six bunches of any variety, Samuel Hartwell, Moore's Early,	3 00
Second, B. G. Smith, Champion,	2 00
Third, C. N. Brackett, "	1 00
Gratuities:—	
B. G. Smith, Grapes,	1 00
Mrs. H. V. Draper, Plums,	1 00
Horace Partridge, Grapes,	1 00
John C. Park, Crab Apples,	1 00
Warren Fenno. Collection,	1 00
M. W. Chadbourne, "	1 00

SEPTEMBER 5.

APPLES.— Foundling, L. W. Weston,	$3 00
Second, Warren Fenno,	2 00
Gravenstein, Frank Smith,	3 00
Second, Samuel Hartwell,	2 00
Third, Warren Heustis,	1 00
Porter, Samuel Hartwell,	3 00
Second, C. W. Grant,	2 00
Third, Mrs. A. M. Winn,	1 00
Any other variety, Mrs. M. A. Fullick, Williams,	2 00
Second, Samuel Hartwell, Sparhawk,	1 00
PEARS.—Andrews, Mrs. Mary Langmaid,	2 00
Second, B. G. Smith,	1 00
Boussock, George S. Harwood,	2 00
Second, Horace Eaton,	1 00
Any other variety, William H. Hunt, Clapp's Favorite,	2 00
Second, S. Lockwood, " "	1 00
PLUMS.—Collection of not less than four varieties, Samuel Hartwell,	3 00
Second, Horace Eaton,	2 00
Third L. W. Goodell,	1 00
Any other variety, F. J. Dutcher, McLaughlin,	2 00
Second, Samuel Hartwell,	1 00
NATIVE GRAPES.— Six bunches of Hartford, Cephas H. Brackett,	3 00
Moore's Early, John B. Moore & Son,	3 00
Second, Samuel Hartwell,	2 00
Any other variety, B. G. Smith, Cottage,	3 00
Second, B. G. Smith, Ives's Seedling,	2 00

Gratuities:—

M. W. Chadbourne, Collection,	1 00
Samuel Hartwell, "	1 00

ANNUAL EXHIBITION.

SEPTEMBER 15, 16, 17, AND 18.

Special Prizes.

Twelve Gravenstein Apples, C. C. Shaw,	$5 00
Twelve Bartlett Pears, Mrs. Mary Langmaid,	5 00
Twelve bunches of Native Grapes, of any variety, John B. Moore & Son, Moore's Early,	5 00
For the heaviest and best ripened bunch of any Foreign Black Grape, not less than five pounds, David Allan, Alnwick Seedling,	8 00
For the heaviest and best ripened bunch of any Foreign White Grape, not less than five pounds, David Allan, Syrian,	8 00

Regular Prizes.

APPLES.— Baldwin, C. C. Shaw,	$4 00
Second, Samuel Hartwell,	3 00
Third, L. W. Weston,	2 00
Danvers Sweet, C. C. Shaw,	2 00
Second, J. T. Foster,	1 00
Fall Orange or Holden, Samuel Hartwell,	3 00
Second, C. W. Grant,	2 00
Fameuse, Horace Eaton,	3 00
Second, George V. Fletcher,	2 00
Foundling, Warren Fenno,	4 00
Second, L. W. Weston,	3 00
Garden Royal, J. C. McNeil,	3 00
Second, Samuel Hartwell,	2 00
Golden Russet, the second prize to Warren Fenno,	1 00
Gravenstein, Samuel Hartwell,	4 00
Second, Charles H. Stearns,	3 00
Third, Warren Heustis,	2 00
Hubbardston, C. N. Brackett,	4 00
Second, L. W. Weston,	3 00
Third, Josiah Crosby,	2 00
Hunt Russet, Samuel Hartwell,	3 00
Lady's Sweet, Warren Fenno,	2 00
Leicester, the second prize to O. B. Hadwen,	1 00
Lyscom, Samuel Hartwell,	2 00
Second, C. W. Grant,	1 00
Maiden's Blush, C. C. Shaw,	2 00
Second, Mrs. A. M. Winn,	1 00
Northern Spy, Warren Fenno,	3 00
Second, C. C. Shaw,	2 00
Third, W. A. Morse,	1 00
Porter, C. C. Shaw,	3 00
Second, Francis Smith,	2 00
Pumpkin Sweet, Samuel Hartwell,	2 00
Second, George W. Stearns,	1 00
Rhode Island Greening, C. N. Brackett,	4 00
Second, W. C. Eustis,	3 00
Roxbury Russet, L. W. Goodell,	4 00
Second, John L. D'Wolf,	3 00
Third, C. C. Shaw,	2 00
Tolman's Sweet, C. C. Shaw,	3 00
Second, J. T. Foster,	2 00
Third, Josiah Crosby,	1 00
Tompkins King, W. A. Morse,	3 00
Second, C. C. Shaw,	2 00
Washington Royal, Samuel Hartwell,	3 00
Second, O. B. Hadwen,	2 00

Washington Strawberry, Warren Fenno,	$2 00
Any other variety, George M. Stearns, Chenango,	3 00
Second, C. C. Shaw, Oldenburg,	2 00
Third, C. C. Shaw, Sudbury Sweet,	1 00
CRAB APPLES. — Twenty-four specimens of Hyslop, Cephas H. Brackett,	2 00
Second, B. Judkins,	1 00
Transcendent, C. H. Brackett,	2 00
Second, Samuel Hartwell,	1 00
PEARS. — Angouleme, John McClure,	4 00
Second, Edwin A. Hall,	3 00
Third, W. P. Walker,	2 00
Anjou, Mrs. Mary Langmaid,	4 00
Second, John McClure,	3 00
Third, C. N. Brackett,	2 00
Fourth, E. W. Wood,	1 00
Bartlett, John McClure,	4 00
Second, Mrs. Mary Langmaid,	3 00
Third, N. D. Harrington,	2 00
Fourth, A. S. McIntosh,	1 00
Belle Lucrative, Mrs. Mary Langmaid,	2 00
Second, Warren Heustis,	1 00
Bosc, George S. Curtis,	4 00
Second, Mrs. Mary Langmaid,	3 00
Third, W. P. Walker,	2 00
Fourth, George S. Harwood,	1 00
Boussock, John B. Turner,	2 00
Second, Marshall P. Wilder,	1 00
Clairgeau, Mrs. Mary Langmaid,	3 00
Second, W. P. Plimpton,	2 00
Third, Charles F. Curtis,	1 00
Comice, George S. Harwood,	3 00
Second, Horace Eaton,	2 00
Third, Warren Fenno,	1 00
Dana's Hovey, M. W. Chadbourne,	4 00
Second, George Frost,	3 00
Third, Warren Fenno,	2 00
Diel, Marshall P. Wilder,	3 00
Second, George Newmarsh,	2 00
Goodale, O. B. Hadwen,	2 00
Second, Marshall P. Wilder,	1 00
Hardy, C. F. Curtis,	3 00
Second, A. S. McIntosh,	2 00
Howell, E. W. Wood,	2 00
Second, C. E. Richardson,	1 00
Lawrence, Mrs. Mary Langmaid,	3 00
Second, C. N. Brackett,	2 00

Louise Bonne of Jersey, B. G. Smith,	$3 00
Second, George S. Harwood,	2 00
Marie Louise, John L. D'Wolf,	2 00
Second, A. S. McIntosh,	1 00
Merriam, John L. D'Wolf,	3 00
Second, Warren Fenno,	2 00
Onondaga, Warren Fenno,	2 00
Second, Marshall P. Wilder,	1 00
Paradise of Autumn, C. M. Hovey,	3 00
Second, Marshall P. Wilder,	2 00
Seckel, George S. Harwood,	4 00
Second, Samuel Hartwell,	3 00
Third, Warren Fenno,	2 00
Sheldon, George S. Harwood,	4 00
Second, Cephas H. Brackett,	3 00
Third, C. F. Curtis,	2 00
Souvenir du Congrès, C. N. Brackett,	2 00
Second, Warren Fenno,	1 00
St. Michael Archangel, Warren Heustis,	3 00
Second, T. M. Davis,	2 00
Superfin, Warren Fenno,	2 00
Second, A. S. McIntosh,	1 00
Urbaniste, A. S. McIntosh,	3 00
Second, John L. Bird,	2 00
Vicar, A. S. McIntosh,	2 00
Second, S. Lockwood,	1 00
Winter Nelis, W. P. Walker,	2 00
Second, E. W. Wood,	1 00
Any other variety, Warren Fenno, De Tongres,	3 00
Second, Horace Eaton, Frederick Clapp,	2 00
Third, A. S. McIntosh, Kingsessing,	1 00
PEACHES. — Any variety, Warren Fenno, Seedling,	3 00
NECTARINES. — Any variety, Warren Fenno,	2 00
PLUMS. — Not less than four varieties, Samuel Hartwell,	5 00
Second, Horace Eaton,	4 00
Third, John B Moore & Son,	3 00
Any other variety, Samuel Hartwell, Jefferson,	3 00
Second, F. J. Dutcher, McLaughlin,	2 00
Third, F. J. Dutcher, Green Gage,	1 00
NATIVE GRAPES. — Six bunches of Concord, Cephas H. Brackett,	3 00
Second, Marshall P. Wilder,	2 00
Delaware, Cephas H. Brackett,	3 00
Second, Joseph S. Chase,	2 00
Third, Horace Eaton,	1 00
Massasoit, John B. Moore & Son,	3 00
Second, Cephas H. Brackett,	2 00
Third, Joseph S. Chase,	1 00

Moore's Early, John B. Moore & Son,	$3 00
Second, Charles Williams,	2 00
Third, Samuel Hartwell,	1 00
Wilder, John B. Moore & Son,	3 00
Second, Marshall P. Wilder,	2 00
Worden, John B. Moore & Son,	3 00
Second, Samuel Hartwell,	2 00
Third, B. Judkins,	1 00
Any other variety, B. G. Smith, Lindley,	3 00
Second, Marshall P. Wilder, Niagara,	2 00
Third, Samuel Hartwell, Cottage,	1 00
FOREIGN GRAPES.— Four varieties, two bunches of each, David Allan,	10 00
Third prize, E. H. Luke,	6 00
Fourth, B. G. Smith,	4 00
Two bunches of Black Hamburg, David Allan,	5 00
Wilmot's Black Hamburg, the third prize to B. G. Smith,	3 00
Muscat of Alexandria, David Allan,	5 00
Any other variety, David Allan, Lady Downes,	5 00
The third prize to E. H. Luke, Golden Hamburg,	3 00
CRANBERRIES.— Half peck, Dwight C. Robbins,	2 00
Second, C. W. Grant,	1 00

Gratuities:—

Albert Bresee, Apples,	1 00
C. W. Grant, "	1 00
M. W. Chadbourne, Apples and Pears,	3 00
W. A. Morse, " " "	2 00
C. N. Brackett, Pears,	2 00
Marshall P. Wilder, "	2 00
Warren Fenno, "	2 00
Mrs. W. A. Winn, "	1 00
Stillman S. Hovey, "	1 00
Michael Finegan, "	1 00
B. G. Smith, "	1 00
C. H. Johnson, "	1 00
William H. Hunt, " and Quinces,	1 00
William C. Strong, Grapes,	2 00
John B. Moore & Son, "	2 00
Marshall P. Wilder, "	2 00
A. J. Tillson, Pocklington Grapes,	1 00
Edmund D. Sturtevant, Papaws (*Asimina triloba*),	1 00
H. L. Barnes, Osage Oranges,	2 00

SEPTEMBER 26.

Gratuity:—

Samuel Hartwell, Apples,	2 00

OCTOBER 3.

APPLES.— Gravenstein, Francis Smith,	$3 00
Second, William T. Hall,	2 00
Third, Samuel Hartwell,	1 00
Fall Orange, Samuel Hartwell,	3 00
Second, C. W. Grant,	2 00
Porter, Edmund F. Knight,	3 00
Second, William Patterson,	2 00
Any other variety, M. W. Chadbourne, Hubbardston,	3 00
Second, Warren Fenno, Queen,	2 00
PEARS.— Angouleme, W. S. Janvrin,	3 00
Second, S. G. Damon,	2 00
Third, John McClure,	1 00
Bosc, Mrs. Mary Langmaid,	3 00
Second, W. P. Walker,	2 00
Third, W. S. Janvrin,	1 00
Clairgeau, William T. Hall,	3 00
Second, S. G. Damon,	2 00
Third, Warren Fenno,	1 00
Comice, George S. Harwood,	3 00
Second, Horace Eaton,	2 00
Third, Warren Fenno,	1 00
Frederick Clapp, Horace Eaton,	3 00
Louise Bonne of Jersey, B. G. Smith,	3 00
Second, T. M. Davis,	2 00
Third, Mrs. A. M. Winn,	1 00
Seckel, George S. Harwood,	3 00
Second, N. D. Harrington,	2 00
Third, W. C. Eustis,	1 00
Sheldon, W. S. Janvrin,	3 00
Second, J. W. Knowles,	2 00
Third, John L. Bird,	1 00
Superfin, George H. Dickerman,	3 00
Second, Warren Fenno,	2 00
Third, A. S. McIntosh,	1 00
Urbaniste, A. S. McIntosh,	3 00
Second, M. W. Chadbourne,	2 00
Third, Warren Fenno,	1 00
Any other variety, Warren Fenno, De Tongres,	3 00
Second, A. S. McIntosh, Marie Louise,	2 00
Third, George H. Dickerman, Howell,	1 00
QUINCES.— B. G. Smith,	2 00
Second, Mrs. M. T. Goddard,	1 00
PEACHES.— Any variety, Warren Fenno,	3 00
Second, N. D. Harrington,	2 00

NATIVE GRAPES.— Six bunches of Brighton, Joseph S. Chase,	$3 00
Second, B. G. Smith,	2 00
Third, S. G. Damon,	1 00
Concord, A. J. Bigelow,	3 00
Second, J. P. Hayward,	2 00
Third, S. G. Damon,	1 00
Delaware, G. B. Andrews,	3 00
Third prize, Horace Eaton,	1 00
Iona, Horace Eaton,	3 00
Second, F. H. Perry,	2 00
Third, B. G. Smith,	1 00
Isabella, S. G. Stone,	3 00
Second, J. P. Hayward,	2 00
Third, B. G. Smith,	1 00
Massasoit, John B. Moore & Son,	3 00
Second, S. G. Damon,	2 00
Third, Cephas H. Brackett,	1 00
Moore's Early, John B. Moore & Son,	3 00
Second, Samuel Hartwell,	2 00
Prentiss, Joseph S. Chase,	3 00
Second, F. J. Dutcher,	2 00
Wilder, J. P. Hayward,	3 00
Second, John B. Moore & Son,	2 00
Third S. G. Damon,	1 00
Any other variety, John B. Moore & Son, Hayes,	3 00
Second, J. P. Hayward, Worden,	2 00
Third, B. G. Smith, Lindley,	1 00
FOREIGN GRAPES.— Two bunches of any variety, J. P. Hayward, Muscat Hamburg,	4 00
Second, J. P. Hayward, Black Hamburg,	3 00
Third, J. P. Hayward, Syrian,	2 00

Gratuities: —

Samuel Hartwell, Apples,	2 00
C. N. Brackett, Pears,	2 00
A. S. McIntosh, "	2 00
B. G. Smith, "	1 00
M. W. Chadbourne, "	1 00
Warren Fenno, "	1 00
S. G. Damon, Apples and Pears,	2 00
G. B. Andrews, Concord Grapes,	1 00
C. W. Grant, Cranberries,	1 00

OCTOBER 10.

Gratuities: —

John F. Jones, Apples,	1 00
Robert Manning, Pears,	1 00
Clifton H. Paige, "	1 00

OCTOBER 17.

Gratuity:—

N. D. Harrington, Pears,	$1 00

CHRYSANTHEMUM SHOW.

NOVEMBER 12 AND 13.

French Premiums.

APPLES.—Baldwin, C. C. Shaw,	$2 00
Second, Samuel Hartwell,	1 00
Danvers Sweet, C. C. Shaw,	2 00
Second, J. T. Foster,	1 00
Hubbardston, M. W. Chadbourne,	2 00
Second, William T. Hall,	1 00
Hunt Russet, C. W. Grant,	2 00
Second, Samuel Hartwell,	1 00
Lady's Sweet, Warren Fenno,	2 00
Northern Spy, William T. Hall,	2 00
Second, Warren Fenno,	1 00
Rhode Island Greening, A. S. McIntosh,	2 00
Second, Samuel McIntosh,	1 00
Roxbury Russet, Cephas H. Brackett,	2 00
Second, L. W. Goodell,	1 00
Tolman's Sweet, C. C. Shaw,	2 00
Second, J. T. Foster,	1 00
Tompkins King, John Parker,	2 00
Second, James H. Clapp,	1 00

Society's Prizes.

PEARS.—Angouleme, S. G. Damon,	3 00
Second, Varnum Frost,	2 00
Third, T. M. Davis,	1 00
Anjou. William T. Hall,	3 00
Second, S. G. Damon,	2 00
Third, Warren Fenno,	1 00
Comice, George S. Harwood,	3 00
Second, Warren Fenno,	2 00
Third, John McClure,	1 00
Dana's Hovey, John B. Moore & Son,	3 00
Second, Warren Fenno,	2 00
Third, M. W. Chadbourne,	1 00
Glout Morceau, John L. Bird,	3 00
Second, Warren Fenno,	2 00
Third, Mary Gardner,	1 00

Josephine of Malines, Warren Fenno,	$3 00
Second, B. G. Smith,	2 00
Third, John L. Bird,	1 00
Langelier, S. G. Damon,	3 00
Second, A. S. McIntosh,	2 00
Third, John L. Bird,	1 00
Lawrence, Andrew McDermott,	3 00
Second, John McClure,	2 00
Third, William T. Hall,	1 00
Vicar, A. S. McIntosh,	3 00
Second, William T. Hall,	2 00
Third, Samuel McIntosh,	1 00
Winter Nelis, Andrew McDermott,	3 00
Second, Jesse Haley,	2 00
Third, E. W. Wood,	1 00
Any other variety, S. G. Damon, Diel,	3 00
Second, B. G. Smith, "	2 00
Third, S. G. Damon, Clairgeau,	1 00

Gratuities:—

C. W. Grant, Apples,	2 00
Mrs. M. T. Goddard, "	1 00
A. S. McIntosh, Pears,	3 00
J. P. Knight, Seedling Japanese Pears,	1 00
C. N. Brackett, Apples and Pears,	1 00
Warren Fenno, " " "	2 00
George Seaverns, Quinces,	1 00
R. Manning, "	1 00
John Parker, "	1 00
John B. Moore & Son, Grapes,	1 00
C. Terry, "	1 00
S. G. Damon, "	1 00
George W. Holden, "	1 00
M. W. Chadbourne, Collection,	2 00

NOVEMBER 28.

Gratuities:—

T. Putnam Symonds, Apples and Pears,	2 00
Joseph S. Chase, Grapes,	1 00

REPORT

OF THE

COMMITTEE ON VEGETABLES,

FOR THE YEAR 1885.

By CHARLES N. BRACKETT, Chairman.

In submitting the following report, your Committee have the pleasure of being able to say that the various vegetable exhibits throughout the season have been equal in quality to those of any previous year. The quantity shown at the Annual Exhibition was perhaps not quite so great as in some former seasons, yet any deficiency in this respect was we think more than made up by the variety and superior quality of the exhibits.

The Committee cannot but congratulate the Society on the good results thus far attained in the department with which they are connected. There has been an advance in quality from year to year in the vegetables exhibited, a constantly increasing interest on the part of the competitors for its prizes, and a more general attendance at its exhibitions by the public. When in these exhibitions, familiar vegetables display from year to year a continually improving standard of quality, we may safely attribute this continued increase in excellence rather to improved methods of cultivation, than to transient and accidental circumstances, or to exceptional conditions of soil or season.

The policy of offering prizes instead of awarding gratuities, has justified our favorable expectation during the past season. In forced vegetables, during the months of January and February, we had upon our tables more than double the quantity of exhibits ever before seen at that period of the year. Many of the speci-

mens were such as could hardly be excelled, and all were noteworthy products of skilful cultivation. The high praise which was accorded them is good evidence of the value set upon this branch of our exhibitions. The money value of the prizes is small; that alone cannot be the impelling motive. Rather the spirit of rivalry among contributors, which springs from comparing individual results, and the visibly increasing public interest manifested in our exhibitions, have resulted in giving us a higher standard of excellence in our products, and are important elements in our success.

For much of the interest attending the weekly exhibitions, especially those of the earlier part of the season, the Society is under obligations to Messrs. George Hill, Cephas H. Brackett, W. W. Rawson, George F. Stone, William D. Philbrick, Josiah Crosby, Mrs. Francis B. Hayes, and others, who have made frequent exhibition of forced vegetables in great variety. Their contributions consisted of Cucumbers, Radishes, Lettuce, Mushrooms, Brussels Sprouts, Dandelions, Rhubarb, Asparagus, Tomatoes, and Parsley. The especially fine specimens of Asparagus and Rhubarb shown February 7, were from Mrs. Francis B. Hayes. As a very successful cultivator of the Mushroom, Cephas H. Brackett has for several seasons won distinction. He has uniformly shown the best specimens, and taken the first prizes. To judge from the character of the exhibits he has made, he evidently believes that "if a thing is worth doing at all it is worth doing well." We have certainly seen abundant proofs of this at frequent exhibitions, and of his skill in producing only the choicest and best specimens of whatever he undertakes to grow. As a contributor of forced vegetables he has shown a commendable zeal in sustaining our winter and early spring shows. Now that we are to have, in the coming season, a full list of prizes for vegetables grown under glass, we have ground for hoping that this important and very rapidly increasing branch of horticulture will become a yet more prominent feature in our exhibitions.

The liberal increase in the amount placed at the disposal of the Committee, for prizes and gratuities during the coming year, has enabled them to offer a list of premiums for forced vegetables to be shown in the month of April, and also to make other and important additions and alterations in the Schedule. A glance at the prize list for 1886 will show an appropriation of $1,000 for

vegetables. This is an increase on the appropriation of the past year of $200, and shows not only that the Society fully recognizes the present usefulness and importance of this branch of horticulture, but that it has a distinct purpose and a progressive policy in thus further encouraging and stimulating the efforts of those engaged in it.

Most of the specimens offered for prizes the past season have possessed points of superior excellence. In a few instances, as may be seen by reference to the list of awards, they have fallen so far below the standard that the prizes have been wholly withheld; sometimes the first has been withheld and the second or third awarded; that course being followed which in the judgment of the Committee was best adapted to each particular case. This we are aware is exceedingly unpopular with some exhibitors, who claim that an exhibitor is entitled to a first premium on the mere ground that he is the only one competing, although his specimens may be very inferior. The Committee believe that the stricter practice should be persistently followed, as thus only can the standard of excellence be maintained, and poor and inferior specimens be excluded from our exhibitions.

The weekly exhibitions have, we think, been in advance of those of last year. Competition has been unusually active, and the exhibits, both as to quality and variety, have been among the best, though by no means so large as we hope to see the coming season.

Peas have been shown in more than the usual quantity. Among the earlier varieties, the American Wonder still takes the lead, and at the Rose and Strawberry Show was awarded the first prize over all competitors. Of the varieties of recent introduction, Carter's Stratagem, Sharp's Early Paragon, and Invincible, seem the most deserving of notice. The Stratagem is a new green wrinkled pea of great merit, and probably the handsomest and most productive of its class. The vines grow about two feet in height, and are covered with immense pods, filled with peas of the largest size, of the finest quality for the table. This variety was shown by the Chairman, July 11, and has invariably taken the first prize during the season, whenever it has been put in competition. The Paragon and Invincible were shown by C. H. Hovey & Co. Both were very attractive and both were awarded prizes, — the Paragon receiving a first prize, and the Invincible a second.

Tomatoes, as in seasons past, have been a very prominent feature at our exhibitions. The first prize day was July 18; but the specimens offered were not considered worthy of the first prize, and it was consequently withheld. July 25, however, and also at subsequent exhibitions, the specimens shown were remarkably fine, and formed a very interesting and attractive portion of the display. Great improvement has been made in this popular vegetable within the past ten or twelve years, in regard to form, texture, and quality; yet little advance, if any, has been made in earliness. Year after year new varieties have been introduced, which in almost every instance were claimed by the originator to be from one to two weeks earlier than their predecessors. Experience proves, however, that if the word *minutes* had been substituted in the place of "weeks," it would in a large majority of cases have come much nearer the truth. At the Annual Exhibition the display of tomatoes was not as large as that of last year, there being but forty-one dishes on exhibition, against eighty on the previous occasion. This was owing mainly to the fact that one, who in years past has been amongst the largest contributors, this year failed to put in an appearance.

At the October and Chrysanthemum shows the displays of vegetables were the largest and best we have ever made at this season of the year.

The past season has been favorable for the growth and development of the Cauliflower; the specimens which have been shown have never been surpassed, if equalled, and reflected the greatest credit upon all the contributors. The first prizes on September 5 and October 3, and the Special and first Regular prizes at the Annual Exhibition, were all awarded to P. G. Hanson. October 10, some very fine specimens were shown by W. P. Walker, the largest of which turned the scales at thirteen pounds. At the Chrysanthemum Show, the first prize for cauliflowers was won by Mrs. Mary T. Goddard, who capped the climax with a splendid specimen weighing fifteen and three-quarters pounds.

The remarks regarding the cauliflower apply equally well to Celery, which was exhibited in great perfection, not only at the Annual Exhibition, but also at the October and November shows. The Special prize at the Annual was awarded to Warren Heustis for Henderson's Half Early Dwarf. The regular prize was taken by Josiah Crosby for Boston Market. The last named competitor also received the first prize at the October show for the same

variety. At the Chrysanthemum show the first prize for celery was won by George Hill, with the Arlington. So numerous and so excellent, and in some cases so closely matched in size, beauty, and quality, have been the specimens exhibited in competition for the prizes, that more than once the Committee have been somewhat embarrassed in deciding on the awards. They have, however, strenuously endeavored in all cases to do the most exact justice to the different competitors; and if they have failed in this respect it has been through error of judgment.

One of the leading attractions at the Annual Exhibition was a new Seedling Potato, grown and exhibited by Albert Bresee of Hubbardton, Vermont, the originator of the Early Rose and other valuable varieties. This was the first time he has ever shown it, and it has not yet been named. There were fifty-two dishes of potatoes on exhibition, but this seedling of Mr. Bresee exceeded them all in beauty and general appearance, and was much admired. The Committee, with others,—among them Hon. Marshall P. Wilder,—had an opportunity of testing its quality, and Mr. Wilder's verdict was, "good enough":—in which all the members of the Committee coincide. As an example of the interest manifested by the visiting public with regard to this new seedling, and to show the confidence with which its value was inferred from its appearance, it may be of interest to state that an offer of fifty dollars was made to Mr. Bresee (in the presence of the Chairman), for the twelve specimens on exhibition, which was increased to one hundred dollars after a test of their quality. The offer was not accepted. This variety will be on exhibition again next season, when a more extended report will be in order, if upon further trial it shall be found up to the standard which its originator expects it to reach. Mr. Bresee will enter it for the Prospective Prize, if it fills the bill.

The annexed list shows the amount awarded in prizes and gratuities for the past season to be $750, leaving an unexpended balance of $80.

All of which is respectfully submitted.

For the Committee,

C. N. BRACKETT, *Chairman.*

PRIZES AND GRATUITIES AWARDED FOR VEGETABLES.

January 3.

Radishes.— Four bunches, George Hill,	$3 00
Second, George F. Stone,	2 00
Cucumbers.— Pair, C. H. Brackett, Brighton,	3 00
Second, C. H. Brackett, White Spine,	2 00
Lettuce.— Four heads of Tennisball, G. F. Stone,	3 00
Second, W. W. Rawson,	2 00
Third, George Hill,	1 00
Mushrooms.— Twenty-four specimens, C. H. Brackett,	3 00

Gratuities :—

George W. Pierce, Brussels Sprouts,	2 00
George F. Stone, Parsley,	1 00

January 17.

Gratuity : —

C. H. Brackett, Cucumbers and Mushrooms,	2 00

January 24.

Gratuity : —

C. H. Brackett, White Spine and Brighton Cucumbers, and Mushrooms,	2 00

January 31.

Gratuity : —

George Hill, Dandelions and Lettuce,	2 00

February 7.

Radishes.— Four bunches, George F. Stone,	3 00
Cucumbers.— Pair of any variety, C. H. Brackett, Brighton,	3 00
Second, C. H. Brackett, White Spine,	2 00
Lettuce.— Four heads of Tennisball, George F. Stone,	3 00
Second, George Hill,	2 00
Third, W. D. Philbrick,	1 00
Mushrooms.— Twenty-four specimens, C. H. Brackett,	3 00

Gratuities: —

George F. Stone, Dandelions and Parsley,	$2 00
George Hill, " " "	1 00
Mrs. Francis B. Hayes, Asparagus,	2 00
W. D. Philbrick, Parsley,	1 00

FEBRUARY 14.

Gratuities:—

Mrs. Francis B. Hayes, Rhubarb and Asparagus,	2 00
Isaac E. Coburn, "	1 00

FEBRUARY 21.

Gratuities: —

Orlando F. Newhall, Tomatoes, Radishes, Mushrooms, Asparagus, and Rhubarb,	4 00
Mrs. Francis B. Hayes, Rhubarb,	1 00
C. H. Brackett, Mushrooms,	1 00

FEBRUARY 28.

Gratuities:—

George F. Stone, Lettuce,	2 00
Josiah Crosby, "	1 00
C. H. Brackett, Mushrooms and Cucumbers,	2 00
C. M. Hovey, "	1 00
Mrs. Francis B. Hayes, Seedling Rhubarb,	1 00

MARCH 7.

Gratuities: —

Josiah Crosby, Dandelions, Radishes, and Lettuce,	2 00
C. H. Brackett, Mushrooms, and two varieties of Cucumbers,	2 00
Warren Heustis, Celery and Radishes,	1 00

MARCH 14.

Gratuities: —

C. H. Brackett, Cucumbers and Mushrooms,	2 00
George F. Stone, Radishes,	1 00

SPRING EXHIBITION.

MARCH 19 AND 20.

RADISHES.— Four bunches of Turnip Rooted, Josiah Crosby,	$3 00
Second, W. D. Philbrick,	2 00
Third, George F. Stone,	1 00
CUCUMBERS.— Pair, C. H. Brackett, White Spine,	3 00

DANDELIONS.— Peck, Josiah Crosby,	$2 00
Second, George F. Stone,	1 00
LETTUCE.— Four heads of Tennisball, George F. Stone,	3 00
Second, Josiah Crosby,	2 00
Third, W. D. Philbrick,	1 00
PARSLEY.— Two quarts, George F. Stone,	2 00
Second, Mrs. E. M. Gill,	1 00
TOMATOES.— Twelve specimens, Charles Winter,	3 00
Second, W. C. Winter,	2 00
Third, Winter Brothers,	1 00

Gratuities:—

C. H. Brackett, Mushrooms and Cucumbers,	2 00
O. F. Newhall, "	1 00
C. H. Hovey & Co., " and Tomatoes,	1 00
E. Saunders, Rhubarb,	1 00

MARCH 28.

Gratuity:—

C. H. Brackett, Rhubarb, Cucumbers, and Mushrooms,	2 00

APRIL 11.

Gratuity:—

Josiah Crosby, Lettuce and Dandelions,	2 00

APRIL 18.

Gratuity:—

C. H. Brackett, Cucumbers, Rhubarb, Tomatoes, Asparagus, and Mushrooms,	4 00

APRIL 25.

Gratuity:—

C. H. Brackett, Rhubarb, Tomatoes, two varieties of Cucumbers, Asparagus, and Mushrooms,	3 00

MAY 2.

Gratuity:—

Warren Heustis, Radishes,	1 00

MAY 9.

CUCUMBERS.— Pair, C. H. Brackett, Brighton,	2 00
Second, C. H. Brackett, Telegraph,	1 00
SPINACH.— Peck, Josiah Crosby,	3 00
LETTUCE.— Four heads, George F. Stone,	2 00
Second, Josiah Crosby,	1 00
RHUBARB.— Twelve stalks, C. H. Brackett, Victoria,	2 00

Gratuities:—

Josiah Crosby, Beets, Carrots, and Dandelions,	$3 00
C. H. Brackett, Collection,	2 00
Warren Heustis, "	2 00

MAY 16.

Gratuities:—

E. Sheppard, Cucumbers,	1 00
M. W. Chadbourne, Asparagus,	1 00

MAY 23.

Gratuities:—

John B. Moore & Son, Asparagus,	1 00
L. W. Weston, "	1 00
Samuel Hartwell, "	1 00
W. K. Wood, Rhubarb,	1 00

JUNE 6.

RADISHES.— Four bunches of Long Scarlet, Josiah Crosby,	2 00
ASPARAGUS.— Four bunches, John B. Moore & Son,	2 00
Second, L. W. Weston,	1 00
CUCUMBERS.— Pair, E. Sheppard, Telegraph,	2 00
Second, C. H. Brackett, Brighton,	1 00
LETTUCE.— Four heads, George F. Stone,	2 00
MUSHROOMS.— Twenty-four, C. H. Brackett,	2 00
RHUBARB.— Twelve stalks, C. H. Brackett, Victoria, 22 lbs.,	2 00
Second, John B. Moore & Son, Monarch, 16 lbs. 15 oz.,	1 00

Gratuities:—

George F. Stone, Spinach,	1 00
C. H. Brackett, Tomatoes,	1 00

JUNE 13.

Gratuity:—

Samuel Hartwell, Asparagus,	1 00

JUNE 20.

Gratuity:—

E. Sheppard, Cucumbers,	1 00

ROSE AND STRAWBERRY EXHIBITION.

JUNE 25 AND 26.

Whitcomb Prizes.

BEETS — Twelve Turnip Rooted, George D. Moore,	$2 00
Egyptian, Josiah Crosby,	2 00

Onions.— Twelve, Josiah Crosby,	$2 00
Second, George D. Moore,	1 00
Cucumbers.— White Spine, Warren Heustis,	2 00
Second, George F. Stone,	1 00
Cabbages.— Four, George D. Moore,	2 00
Lettuce.— Four heads, George F. Stone,	2 00
Second, George D. Moore,	1 00
Peas.— Half-peck, C. N. Brackett, American Wonder,	3 00
Second, S. Hartwell, Advancer,	2 00
Third, George F. Stone, Dan O'Rourke,	1 00

Gratuities:—

Charles Winter, Tomatoes,	1 00
Samuel Hartwell, Asparagus,	1 00
E. Sheppard, Cucumbers,	1 00
John B. Moore & Son, Rhubarb,	1 00

July 4.

Onions.— Twelve, Josiah Crosby,	2 00
Second, George D. Moore,	1 00
Squashes.— Four Long Warted, Warren Heustis,	2 00
Cabbages.— Four, George D. Moore,	3 00
Second, Warren Heustis,	2 00
Peas.— Half-peck, C. H. Hovey & Co., Sharp's Early Paragon,	3 00
Second, C. E. Grant, Advancer,	2 00

July 11.

Potatoes.— Twelve specimens, C. D. Kingman, Chicago Market,	3 00
Second, C. D. Kingman, Savoy,	2 00
Third, Samuel Hartwell, Early Sunrise,	1 00
Squashes.— Four Long Warted, J. Crosby,	2 00
Beans.— Half-peck of String, S. Hartwell,	2 00
Second, S. Hartwell,	1 00
Peas.— Half-peck, C. N. Brackett, Stratagem,	3 00
Second, George F. Stone, Advancer,	2 00
Third, C. H. Hovey & Co., Invincible,	1 00

Gratuities:—

George D. Moore, Beets,	1 00
George F. Stone, Lettuce and Cucumbers,	1 00

July 18.

Cabbages.— Four Drumhead, George D. Moore,	3 00
Second, Warren Heustis,	2 00

PEAS.— Half-peck, C. N. Brackett, Stratagem,	$3 00
Second, C. H. Hovey & Co., Invincible,	2 00
Third, C. N. Brackett, American Wonder,	1 00
TOMATOES.— Twelve, the second prize to George D. Moore,	2 00

Gratuity:—

S. Hartwell, Potatoes,	1 00

JULY 25.

POTATOES.— Twelve, L. W. Weston, Hebron,	3 00
Second, S. Hartwell, Sunrise,	2 00
Third, L. W. Weston, "	1 00
SQUASHES.— Four Marrow, Josiah Crosby,	3 00
SWEET CORN.— Twelve ears, C. N. Brackett, Marblehead,	3 00
Second, Samuel Hartwell, "	2 00
Third, George F. Stone, "	1 00
TOMATOES.— Twelve, C. N. Brackett, Acme,	3 00
Second, George Hill, Emery,	2 00

Gratuities:—

C. N. Brackett, Collection,	2 00
Josiah Crosby, Onions,	1 00

AUGUST 1.

SQUASHES.— Four Marrow, Josiah Crosby,	2 00
PEAS.— Half-peck, C. N. Brackett, Stratagem,	3 00
Second, Warren Heustis, Advancer,	2 00
Third, C. N. Brackett, Yorkshire Hero,	1 00
SWEET CORN.— Twelve ears, Josiah Crosby, Crosby,	2 00
Second, Warren Heustis, "	1 00
TOMATOES.— Twelve, George Hill, Boston Market,	3 00
Second, C. N. Brackett, Acme,	2 00
Third, George Hill, Emery,	1 00

Gratuities:—

George Hill, Greenflesh Melons,	3 00
Mrs. E. M. Gill, Wax Beans,	1 00
Samuel Hartwell, Sunrise Potatoes,	1 00
C. N. Brackett, Collection,	2 00

AUGUST 7.

GREENFLESH MELONS.— Four, George Hill,	3 00
BEANS.— Half-peck of Horticultural, S. Hartwell,	3 00

TOMATOES.—Acme, C. N. Brackett,	$3 00
Emery, George Hill,	3 00
Second, Samuel Hartwell,	2 00
Third, C. N. Brackett,	1 00
Any other variety, George Hill, Boston Market,	3 00
Second, Samuel Hartwell, Perfection,	2 00
Gratuities:—	
Samuel Hartwell, Lima Beans,	2 00
C. E. Grant, Beans,	1 00
Warren Heustis, Corn and Peas,	2 00
C. N. Brackett, Bliss's Abundance Peas, and Tomatoes,	2 00
Cephas H. Brackett, Mushrooms,	1 00

AUGUST 15.

GREENFLESH MELONS.—Four, W. W. Rawson,	3 00
SALMON FLESH MELONS.—Four, Warren Heustis,	3 00
Second, Warren Heustis,	2 00
EGG PLANTS.—Four Round Purple, J. G. Coolidge,	2 00
Second, George D. Moore,	1 00
Gratuities:—	
George D. Moore, Parsnips,	1 00
C. H. Brackett, Mushrooms,	1 00
C. E. Grant, Tomatoes,	1 00
M. W. Chadbourne, Corn,	1 00
Samuel Hartwell, Collection,	3 00
C. N. Brackett, "	2 00
Mrs. William Houseman, Collection,	1 00

AUGUST 22.

POTATOES.—Twelve, S. Hartwell, Savoy,	3 00
Second, L. W. Weston, Hebron,	2 00
Third, C. N. Brackett, Savoy,	1 00
BEANS.—Two quarts of Lima, B. G. Smith,	3 00
Second, Samuel Hartwell,	2 00
PEPPERS.—Twelve, C. N. Brackett,	3 00
Gratuities:—	
W. Heustis, Melons and Corn,	2 00
C. E. Grant, Tomatoes,	1 00
C. H. Brackett, Mushrooms,	1 00
M. W. Chadbourne, Okra,	1 00
Samuel Hartwell, Collection,	3 00

AUGUST 29.

WATERMELONS.—Pair, Samuel Hartwell,	3 00
GREENFLESH MELONS.—Four, Samuel Hartwell,	3 00

Gratuities:—

Warren Heustis, Melons,	$2 00
Josiah Crosby, Celery and Carrots,	2 00
C. E. Grant, Corn and Tomatoes,	1 00
Samuel Hartwell, Collection,	2 00
C. N. Brackett, "	2 00

SEPTEMBER 5.

CAULIFLOWERS.—Four, P. G. Hanson,	3 00
CELERY.—Four roots, George D. Moore,	3 00
Second, Josiah Crosby,	2 00
LIMA BEANS —Two quarts, B. G. Smith,	3 00
Second, Samuel Hartwell,	2 00

Gratuities:—

P. G. Hanson, Turnips and Beets,	2 00
Warren Heustis, Melons,	2 00
C. E. Grant, Corn and Tomatoes,	1 00
Mrs. W. Houseman, Beans, and Kohl Rabi,	1 00
Samuel Hartwell, Collection,	4 00
C. N. Brackett, "	3 00

ANNUAL EXHIBITION.

SEPTEMBER 15, 16, 17 AND 18.

Special Prizes.

CAULIFLOWERS.—Best four, and best kept during the exhibition, P. G. Hanson,	$5 00
CELERY.—Best four roots, and best kept during the exhibition, Warren Heustis,	5 00

Regular Prizes.

BEETS.—Twelve Turnip Rooted, Walter Russell,	3 00
Second, George F. Stone,	2 00
Third, George D. Moore,	1 00
CARROTS.—Twelve Long Orange, W. W. Rawson,	3 00
Second, John L. D'Wolf,	2 00
Twelve Intermediate, Josiah Crosby,	3 00
Second, W. W. Rawson,	2 00
Third, Walter Russell,	1 00
PARSNIPS.—Twelve Long, W. W. Rawson,	3 00
Second, John L. D'Wolf,	2 00
Third, George D. Moore,	1 00

POTATOES.— Four varieties, twelve specimens each, Mrs. M. T. Goddard,	$5 00
Second, C. N. Brackett,	4 00
Third, Samuel Hartwell,	3 00
Clark, Mrs. M. T. Goddard,	3 00
Second, H. B. Watts,	2 00
Third, C. B. Lancaster,	1 00
Hebron, L. W. Weston,	3 00
Second, George W. Pierce,	2 00
Third, Mrs. M. T. Goddard,	1 00
Rose, Mrs. M. T. Goddard,	3 00
Second, George W. Pierce,	2 00
Any other variety, George W. Pierce, Savoy,	3 00
Second, S. A. Merrill, Savoy,	2 00
Third, Samuel Hartwell, "	1 00
SALSIFY.— Twelve roots, Charles F. Curtis,	3 00
Second, Walter Russell,	2 00
Third, John L. D'Wolf,	1 00
TURNIPS.— Twelve Flat, P. G. Hanson,	3 00
Swedish, P. G. Hanson,	3 00
Second, Mrs. M. T. Goddard,	2 00
ONIONS.— Twelve Danvers, George Hill,	3 00
Second, George D. Moore,	2 00
Third, Walter Russell,	1 00
Portugal, Josiah Crosby,	3 00
Second, Walter Russell,	2 00
Red, Walter Russell,	3 00
GREENFLESH MELONS.— Four, Samuel Hartwell,	3 00
Second, William Richardson,	2 00
Third, Charles F. Curtis,	1 00
WATERMELONS.— Two, Samuel Hartwell,	3 00
Second, Benjamin G. Smith,	2 00
Third, Walter Russell,	1 00
SQUASHES.— Four Canada, Josiah Pratt,	3 00
Second, C. B. Lancaster,	2 00
Third, C. N. Brackett,	1 00
Hubbard, P. G. Hanson,	3 00
Second, George Hill,	2 00
Third, W. W. Rawson,	1 00
Marblehead, P. G. Hanson,	3 00
Marrow, W. W. Rawson,	3 00
Second, George Hill,	2 00
Third, P. G. Hanson,	1 00
Turban, P. G. Hanson,	3 00
Second, W. W. Rawson,	2 00
CABBAGES.— Three Drumhead, C. B. Lancaster,	3 00
Second, P. G. Hanson,	2 00

Red, P. G. Hanson,	$3 00
Savoy, C. B. Lancaster,	3 00
Second, P. G. Hanson,	2 00
CAULIFLOWERS.—Four, P. G. Hanson,	3 00
Second, W. W. Rawson,	2 00
Third, W. H. Teel,	1 00
CELERY.—Four roots, Josiah Crosby,	3 00
Second, W. W. Rawson,	2 00
Third, Warren Heustis,	1 00
ENDIVE.—Four specimens, George W. Pierce,	2 00
HORSERADISH.—Six roots, W. W. Rawson,	3 00
Second, George D. Moore,	2 00
Third, Walter Russell,	1 00
BEANS.—Two quarts Lima, Benjamin G. Smith,	3 00
Second, Samuel Hartwell,	2 00
Third, S. A. Merrill,	1 00
CORN.—Twelve ears of Sweet, S. A. Merrill, Stowell's,	3 00
Second, J. J. H. Gregory, Mammoth,	2 00
Third, C. N. Brackett, Potter's Excelsior,	1 00
Yellow or Field, Twenty-five ears, traced, Mrs. M. T. Goddard,	3 00
Second, Horace Eaton,	2 00
EGG PLANTS.—Four Round Purple, George D. Moore,	3 00
Second, J. G. Coolidge,	2 00
Third, George Hill,	1 00
TOMATOES.—Three varieties, twelve specimens each, C. N. Brackett,	5 00
Second, Samuel Hartwell,	4 00
Third, J. J. H. Gregory,	3 00
Acme, C. N. Brackett,	3 00
Second, C. E. Grant,	2 00
Third, Samuel Hartwell,	1 00
Emery, Solomon Shute,	3 00
Second, C. N. Brackett,	2 00
Third, J. J. H. Gregory,	1 00
Paragon, George F. Stone,	3 00
Perfection, C. N. Brackett,	3 00
Second, P. G. Hanson,	2 00
Third, Solomon Shute,	1 00
Any other variety, C. N. Brackett, Cardinal,	3 00
Second, George Hill, Boston Market,	2 00
Third, Stillman S. Hovey, Favorite,	1 00
MARTYNIAS.—Twenty-four, M. W. Chadbourne,	2 00
PEPPERS.—Twenty-four, C. N. Brackett,	3 00
Second, George F. Stone,	2 00
Third, Josiah Crosby,	1 00

Gratuities:—

Albert Bresee, New Seedling Potato,	$3 00
J. J. H. Gregory, Potatoes,	2 00
Joseph G. Coolidge, Greenflesh Melons,	2 00
Warren Heustis, Salmon Flesh Melons,	2 00
George W. Pierce, Bay View Melons,	2 00
P. G. Hanson, Collection of Watermelons,	4 00
P. G. Hanson, Turban Squashes,	1 00
S. A. Merrill, Squash,	1 00
C. H. Hovey & Co., Collection of Squashes,	3 00
C. N. Brackett, Goddard Beans,	1 00
Cephas H. Brackett, Cucumbers and Mushrooms,	2 00
J. J. H. Gregory, Collection,	5 00
Walter Russell, "	3 00
M. W. Chadbourne, "	2 00
Miss Addie Tornberg, "	1 00

SEPTEMBER 26.

Gratuity:—

C. N. Brackett, Tomatoes,	1 00

OCTOBER 3.

SQUASHES.— Four Hubbard, P. G. Hanson,	3 00
Second, Samuel Hartwell,	2 00
Third, Mrs. M. T. Goddard,	1 00
Marrow, the second prize to M. W. Chadbourne,	2 00
BRUSSELS SPROUTS.— Half-peck, Mrs. M. T. Goddard,	3 00
Second, Edgar P. Bliss,	2 00
CABBAGES.— Three Drumhead, C. B. Lancaster,	3 00
Second, P. G. Hanson,	2 00
Third, C. N. Brackett,	1 00
Red, P. G. Hanson,	3 00
Second, C. N. Brackett,	2 00
Savoy, P. G. Hanson,	3 00
Second, C. N. Brackett,	2 00
Third, C. B. Lancaster,	1 00
CAULIFLOWERS.— Four, P. G. Hanson,	3 00
Second, Mrs. M. T. Goddard,	2 00
Third, C. B. Lancaster,	1 00
CELERY.— Four roots, Josiah Crosby,	4 00
Second, George F. Stone,	3 00

Gratuities:—

Cephas H. Brackett, Mushrooms,	1 00
C. E. Grant, Tomatoes,	1 00
George F. Stone, Radishes and Lettuce,	1 00

Benjamin G. Smith, Lima Beans,	$1 00
M. W. Chadbourne, Melons and Squashes,	1 00
C. N. Brackett, Collection,	3 00
Samuel Hartwell, "	3 00
Edgar J. Bliss, "	1 00

OCTOBER 10.

Gratuity:—

W. P. Walker, Cauliflower (weight of largest specimen, 13 lbs.),	2 00

CHRYSANTHEMUM SHOW.

NOVEMBER 12 AND 13.

CAULIFLOWERS.— Mrs. M. T. Goddard,	$3 00
Second, P. G. Hanson,	2 00
BRUSSELS SPROUTS.— Half-peck, G. W. Pierce,	3 00
Second, Mrs. M. T. Goddard,	2 00
CELERY.— Four roots, George Hill, Arlington,	3 00
Second, Warren Heustis, Henderson's Dwarf,	2 00
Third, George Hill, Boston Market,	1 00

Gratuities:—

L. W. Weston, Hebron Potatoes,	1 00
A. S. McIntosh, Artichokes,	1 00
C. H. Brackett, Cucumbers,	1 00
Mrs. M. T. Goddard, Cauliflower (weighing 15¾ lbs.),	1 00
Edgar J. Bliss, Brussels Sprouts,	1 00
C. E. Grant, Celery,	1 00
George F. Stone, White Plume Celery,	1 00
George W. Pierce, Endive,	1 00
Winn, Ricker & Co., Tomatoes,	1 00
Samuel Hartwell, Collection,	2 00

DECEMBER 5.

Gratuities:—

W. W. Rawson, Lettuce,	1 00
C. H. Brackett, Mushrooms,	1 00

DECEMBER 12.

Gratuity:—

Edgar J. Bliss, Brussels Sprouts,	1 00

DECEMBER 26.

Gratuity:—

George Hill, Lettuce,	1 00

REPORT

OF THE

COMMITTEE ON GARDENS,

FOR THE YEAR 1885.

By JOHN G. BARKER, Chairman.

In bringing before you the report of this Committee for the year now closing, we do so with a degree of satisfaction that the object sought in the formation of the Committee has been more adequately attained in this than in some recent years. In looking over the History of the Society we see that in some former years they were more frequently called upon than of late; and at times it appeared as though all the gardens of any note in this vicinity had been visited. We cannot avoid a feeling of regret that opportunities are not even more frequently presented for the performance of the duties of this Committee. With the increase in the number of gardens and the general advance of horticulture, in this special line we are hardly keeping pace with the times. There was no application for the prize for the Amateur Conservatory, or the Collection of Hardy Biennial and Perennial Herbaceous Plants: and for the Peach Orchard, of course none was expected.

The Middlesex Fells.

The first visit of the season was made July 13th, when by invitation of the Hon. Elizur Wright, your Committee viewed the Middlesex Fells. It is doubtless well known to you all that Mr. Wright has taken a very deep interest in this project from its earliest inception, and has done all that lay in his power to make it successful. With a desire that a more extended knowledge of the Fells should be diffused, especially among the members of

this Society, your Committee, with other gentlemen, spent a very delightful day in inspecting under his guidance the territory comprising the Fells. We regret that we have not his own account of the inception and growth of this project, which he had promised us; but the labors of our friend have ended. We shall append a few statistics and facts such as are now at our command, and will bring to your notice as briefly as possible the object of his desire and exertions.

At a public meeting held in 1881 in the town of Medford, in the interest of this project, a letter was read from Mr. John Botume, in which he said: "The territory contains within itself all the requirements of a magnificent natural park — fine old pines and hemlocks, many varieties of oak, walnut, birch, and elm trees; superb water views, not only of inland lakes and ponds but of the ocean, and winding roads and paths among trees through whose interlaced branches the summer sun hardly penetrates. It appears to me that its manifest destiny is to be also the most useful compared with any tract of its size. The distance from the Boston Post Office to its centre is six miles, the same distance that the people of Chicago have to travel to reach their great West Side Park. Her park is artistically beautiful, but it is not nature, and she would give millions for such opportunities as you have before you." Mr. Wright said "that the proposition was to subscribe money enough to buy the property at its assessed value, and then ask the State to take it by right of eminent domain. The territory would be put under the charge of competent men, and in fifty years under proper cultivation and management would produce forty thousand dollars worth of timber annually, which would be for the benefit of the State. All the rocks and hills could be covered with pine in a hundred years." He did not believe a single proprietor of the one hundred and thirty who own the Fells would object to the plan proposed.

Perhaps this outline of the project is enough to bring before you at this time. Nature has done much; art may help; judiciously laid out paths and roadways from the main roads to the prominent points could not fail of making this one of the finest natural parks not only in this Commonwealth, but in this country.

In these days of Forestry Congresses as well as magnificent parks and gardens, on the latter of which so much money is being uselessly spent, can this Society do better than to encourage the

formation of Societies such as the Free Public Forest Association in Lynn, which has been the means of preserving from devastation and destruction many naturally beautiful places, which by a very small expenditure can be made easily accessible, and can be enjoyed by thousands of our people fully as much as the park and boulevard? Let us, as the leading Horticultural Society of America, do all we can to encourage village improvement societies, and in every possible way promote the disposition to improve our suburban towns, villages, and gardens; let our influence be felt more than ever outside the walls of this building, and let us wake up fully to the high privileges and duties that belong to us as members of one of the noblest educational institutions in this country.

Garden of Mrs. Mary E. Goddard.

August 19th, the Committee, upon invitation of Mrs. Mary E. Goddard, went to Hopedale to visit her garden; and take great pleasure in making their report of this visit.

The ground comprises about twenty-five thousand feet, and is devoted largely to a lawn with flower beds cut in the grass.

Perhaps the most noticeable bed was the one on the right of the walk, near the entrance. It was twenty-eight feet in length by four and a half feet in width, and planted in three sections with *Phlox Drummondi*,—*Isabellina* occupying the centre, with *coccinea* and *rosea* at the ends. Lengthwise in the centre of the *Phlox Drummondi rosea* were Blue Victoria Asters; and similarly in the *coccinea*, White Asters, and in the *Isabellina*, Red Asters. A border of Ageratum Tom Thumb surrounded the whole; the stiff woody growth of the Ageratum serving to hold the Phlox upright. By this means all the plants were kept in place without any aid of stakes or twine. The colors of the flowers blended harmoniously, and the whole effect of this arrangement, using but a few varieties judiciously placed, was very pleasing, and fully proved that it does not require a large expenditure of money to have a nice bed of flowers tastefully arranged.

Another bed next the wall, sixty feet long and three and a half feet wide was planted with Single Dahlias, *Salvia splendens*, and Zinnias; with a row of Gaillardia in front, and Tropeolum Spitfire running over the stone wall.

In front of the house a circular bed was arranged with Cannas

in the centre, surrounded by a row of *Coleus Verschaffeltii*, and outside of that a row of *Centaurea gymnocarpa*.

On the east side of the house a crescent shaped bed contained three varieties of Coleus, each color being planted separately.

In another bed we noticed *Tritoma Uvaria* with *Canna Ehemanni* in the centre, bordered with Portulacca; in the spring this bed contained Pansies.

The piazza was covered with neatly trained vines of *Tropæolum Lobbianum*, *Cobæa scandens*, and Thunbergias.

Mrs. Goddard says: "I sow my seeds in April in very gentle heat, and ought to transplant once before putting into the garden, but for lack of room omit to do so except with a few plants of Pyrethrum. I have the flower beds dug very deep and made quite rich, and then a top dressing of phosphate is dug in around each plant, and the earth is loosened at least once a week, until the plants are so large that it is impossible to do so."

Considering that Mrs. Goddard has only a few hot-beds and a bay window in which to raise the plants that filled these beds, we think that no one need despair of having a pleasant and attractive flower garden. Since bedding plants can be obtained at a very low figure, there has been a tendency of late to undervalue annuals; but here we certainly have a very pleasing example of their effective use. We are informed that, aside from the small sum paid for seeds and ten dollars for extra labor, all the work was done by members of the household; and we take pleasure in reporting this flower garden as the most neatly kept, most tastefully arranged, and economically managed of the kind that we have been called upon to visit. The Committee unanimously award Mrs. Goddard the premium of $20 for the best arranged and best kept flower garden.

Vineyards.

As you are all well aware the planting of Vineyards and the growing of grapes for the million have of late years received a good deal of attention, and much land before unproductive, or yielding but small returns from the usual farm crops, has been devoted to the culture of grapes, with satisfactory returns. But in this uncertain climate it is still a question with a great many what variety to plant that will ripen best and market most easily. We find upon inquiry a general complaint that much unripe fruit has

been put upon the market the past season — perhaps tolerably well colored, but still not quite ripe. Indeed, many of the wholesale dealers will answer the question "Who sends you the ripest and best grapes?" without even stopping to think a single moment,—"Why Mr. A's or Mr. B's are always number one, but while Mr. C's are nice fruit, they did not hang on the vine long enough, and are not quite ripe." In view of these facts we have been asked the question more than once, "What varieties of grapes shall I plant in my garden?" In order to meet the requirement of one of the members of the Society, who said to the Chairman of the Garden Committee, "I have no fault to find, but I want to be told not only that you were pleased with this one's place, and that one's skill, but how they did it, and what you would recommend I should do,"— we will answer the one direct question, "What four or five grapes can I plant in my garden with a reasonable surety in ordinary seasons of having the fruit ripen?" As far as our observation and experience go, and after conference with the Chairman of the Fruit Committee, we recommend to the amateur, for this climate, the Moore's Early and Hayes for early; next the Worden, and later the Concord and Niagara.

Vineyard of Jonas P. Hayward.

The past season your Committee received invitations from Jonas P. Hayward of Ashby, and Samuel Hartwell of Lincoln, to inspect their vineyards. Mr. Hayward entered two vineyards; which your Committee visited twice, the first visit being early in September. We found both vineyards in the highest and best possible state of cultivation, and the fine clean handsome foliage and good growth of wood such as is seldom excelled, while the crop of fruit was certainly one of the evenest it has been our fortune to see; indeed both vineyards, especially No. 1, afforded evidence that Mr. Hayward had given thought and time to bring about the best possible results. He makes the Concord the main crop, and prefers Thanksgiving time to any earlier date for marketing his grapes. At our second visit, on the 6th of October, the crop was ripe, and it was our privilege to taste as well as look. Several other gentlemen accompanied the Committee at this time, all practical growers, and we do not hesitate to pronounce vineyard No. 1 to be one of the best vineyards of Concord grapes we have

ever inspected. To this vineyard your Committee have unanimously awarded the First Prize of $30.

Vineyard No. 2, being on a sidehill, had washed somewhat, but the general remarks made upon the first mentioned apply equally to this. Here we found the Niagara, and we are sure that we only express the opinion of all present, when we say that its condition exceeded our expectations; and those who had doubts in regard to its ripening qualities are now quite ready to give it a place with the Concord as a very desirable late grape. The following statement by Mr. Hayward will be read with interest by all:

To the Garden Committee of the Massachusetts Horticultural Society:—

My vineyard No. 1 contains twelve hundred vines, all Concords, except one row containing a considerable number of varieties. It was planted in 1877, in light gravelly loam, the vines being set six feet apart in rows eight feet apart. The vines are trained on a four-wire trellis, fruiting two arms of six feet each on each vine, at the same time growing two canes for renewal.

When the shoots are about eighteen inches long they are cut back to six leaves; also cutting all tendrils and all but two of the growing fruit buds. All laterals are cut back to one leaf, which has to be done two or three times each season, according to the vigor of the plant. When the grapes are about the size of peas, the clusters are straightened, counted, and cut down to thirty or less. My aim is to raise ten pounds to the vine.

The renewal canes I have sometimes kept cut back to six feet during the summer; but for the past two years I have let them grow as far as they would, which has been from eight to twelve feet, and then at the fall pruning cut back to six feet. I do not know which is the better way.

I have tried to raise grapes without fertilizing, but of late years have applied chemicals to the value of about one cent per vine. This year I have doubled it. On this vineyard I have applied this year—

100	lbs.	Sulphate of Ammonia,
325	"	Muriate of Potash,
400	"	Dissolved Bone-black,
75	"	Sulphate of Magnesia,
300	"	South Carolina Rock Phosphate.

This was thoroughly mixed and evenly sown broadcast. Then, for an experiment, I sowed one bag of Stockbridge Fertilizer for Grapes on one-half the vineyard. The difference is hardly noticeable.

The reason for increasing the amount of fertilizer was that the foliage had not always been quite satisfactory; but this year it is all I could desire. I keep the ground free from weeds, and cultivate thoroughly with an Acme harrow.

Vineyard No. 2 contains two thousand vines, a part of which is the oldest vineyard but one in town. Five hundred and fifty vines were planted in 1867; others were added in 1871 and 1872. These are all Concords. In 1881 I added three hundred Niagaras.

My treatment of this vineyard has been the same as that of No. 1, with the exception that, being on a sidehill and apt to wash, it seems to require a larger supply of fertilizer. This year I have applied as follows:

672	lbs.	Muriate of Potash,
1,000	"	Dissolved Bone-black,
125	"	Sulphate of Magnesia,
150	"	Sulphate of Ammonia,
690	"	South Carolina Rock Phosphate,

and one bag of Stockbridge Fertilizer, with the same result as on vineyard No. 1.

J. P. HAYWARD.

Vineyard of Samuel Hartwell.

September 8th the Committee visited Samuel Hartwell's vineyard at Lincoln, and found Moore's Early the variety made the specialty in this case. Mr. Hartwell, unlike Mr. Hayward, wanted an early grape, his theory being that it can be marketed quickly and got out of the way without handling more than once. The Committee made a careful inspection of the vineyard and were pleased with the mode of training and general cultivation, and are quite prepared to again recommend the Moore's Early as the best hardy grape for general cultivation. They unanimously award Mr. Hartwell the Second Prize of $20 for his vineyard, and call your attention to his statement subjoined.

To the Garden Committee of the Massachusetts Horticultural Society:—

Gentlemen, — The vineyard of Moore's Early grape vines offered by me for your inspection and the Society's prize was planted in the spring of 1881, the vines being then two years old and set in rows nine feet apart, and eight feet apart in the row. The location of the vineyard is on high warm land, naturally well drained; the soil is a gravelly loam, with numerous large stones both above and below the surface;— which inclines slightly to the eastward. For the past three years no other crop has been raised on the ground; and no manure has been applied, except about five barrels of ground bone and muriate of potash,— two parts of the former to one of the latter mixed, and applied broadcast each year. The first two years the vines were tied to stakes and two buds allowed to grow. In the spring of 1883 trellises were built by setting locust posts at each end of each row, and also along the rows, leaving two vines in each space between the posts. Four strands of No. 14 wire were stretched and fastened by means of staples to each row of posts, the upper wire being about five feet from the ground. The end posts were braced to keep the wires straight. To these wires the arms of the vines, from four to six in number, each from three to four feet long, are tied, care being taken to distribute the arms as evenly as possible over the wires. I very seldom tie to the upper wire, as I prefer to have the foliage on it shade the fruit on the other wires. I find it unnecessary to do any summer tying, and do very little summer pruning, but usually cut off the ends of branches inclined to grow between rows, so that the rows will look tidy, and leave the spaces clear for cultivation,— which is kept up with the cultivator and hoe until August, or as long as the weeds continue to grow. The vines have fruited three years: in 1883 they produced about one thousand pounds of fruit; in 1884 about five thousand five hundred pounds, and in 1885 about nine thousand pounds. I have always commenced to pick for market from the 5th to the 10th of September; at the latter date the fruit is ripe enough to pick clean. I prune the vines in November and December, leaving from four to six arms of strong, new wood three or four feet long, as near the roots as convenient. I tie these arms to the wires in mild days in winter, or in early spring.

By the above method, I find most of the work can be done at the time of the year when I have most leisure.

Respectfully submitted by

SAMUEL HARTWELL.

LINCOLN, October 15th, 1885.

In addition to our observations of the vineyard, we were particularly interested in noticing the culture of the Melon, to which Mr. Hartwell has given special attention, and the qualities of which ample opportunity was afforded the Committee to test. So favorably were we impressed with the result, that we induced Mr. Hartwell to give us a statement of his mode of cultivation, which we append, and the Committee unanimously award him a gratuity of $10 for successful culture of the melon.

JOHN G. BARKER, *Chairman of the Garden Committee of the Massachusetts Horticultural Society:—*

DEAR SIR, — At your request I make a short statement of my method of planting and caring for the crop of Greenflesh Melons your Committee saw on my farm early in September last. The ground is what is termed "old," having been planted four or five years; the soil is a gravelly loam, naturally dry, with the surface inclining to the eastward. It was manured with eight or ten cords of stable manure, broadcast and ploughed in. The seed was saved by myself from well selected stock, which, for want of a better name, I will call the Early Montreal, and was planted under glass the first week in May. For convenience in transplanting, I made two hot-beds of eight sashes each, locating them quite centrally in the field; planted eight seeds in each hill, allowing to it a space of about six inches square in the bed, and watered and aired as needed. The land was furrowed both ways, about five feet apart, and at each intersection of the furrows a place was dug with a hoe in which to set a hill. I like to have the plants set as fast as the holes are dug, so as to have the earth as fresh as possible. When ready to set the plants (which is usually from the 5th to the 10th of June), after being careful to have the ground in the hot-bed well wet and kept wet while planting, a piece of stove pipe about six inches long, to which an iron handle has been riveted, is pressed down over a hill, a spade is

forced under the hill, and, with one hand holding the spade and the other the handle to the pipe, the hill is carried to its allotted space in the field. After the hill is set in the hole dug to receive it and the spade withdrawn, I draw the loose earth around the pipe on all sides, and then withdraw the pipe. I then press down the earth around the hill, and with a hoe draw as much more as is needed about the plant. I continue thus with each hill, always being careful not to disturb the earth about the roots of the plants. When they are well established, I thin to three vines in each hill, cultivate and keep clean, and in due time expect to "reap if I faint not."

Respectfully submitted.

SAMUEL HARTWELL.

LINCOLN, MASS., October 15th, 1885.

THE ARNOLD ARBORETUM.

Our next visit was on the 26th of August, to the Arnold Arboretum, first stopping at the residence of our Treasurer, by whom the Committee were hospitably entertained. After a delightful drive through the pleasant avenues of Jamaica Plain, we found ourselves at the Arboretum of Harvard College, which contains one hundred and sixty-five acres of land, quite varied in character. This is a portion of the well known Bussey Farm, in that part of Boston formerly known as West Roxbury, and is within a few minutes walk of the Forest Hills station on the Boston and Providence Railroad, making it of easy access to visitors. The location is such that the experiments here made will be of great value to New England, and of general interest to a large portion of the whole country. The Arboretum is yet in its infancy, having been commenced only in 1874, when the seeds of the first trees were planted; so that excepting the older trees previously on the place, of which there are many, a great portion are only nursery plants, which on account of certain arrangements made with the city of Boston could not be planted in permanent positions until the laying out of some of the roadways had been completed. This being accomplished in part, the coming spring will see many of the botanical orders planted where they are to remain permanently, the planting being as far as possible in botanical sequence. Along

the roadways will be planted both native species and those of foreign introduction, including all the varieties, so that even one not possessing special botanical knowledge can at a glance comprehend the arrangement and see by comparison the plants which best endure our climate. The Arboretum will thus be a living museum, where the nurseryman, gardener, and private land-owner may come for trustworthy information regarding all trees or shrubs, which will save them the cost of personal experiments, and of delays caused by unfortunate selections.

The collection of living plants at the Arboretum is richer in species than any other in the United States; numbering at the present time over two thousand species and varieties of woody plants. Many of these may prove failures; but it is the work of the Arboretum to show by living illustrations what to select and what to avoid. The collection is being continually increased by a system of exchanges with botanic gardens and similar institutions, both public and private, in every part of the world within the temperate zone. Experiments are also being made with seeds of plants taken from widely different localities, with the hope that additions may be made to our lists of hardy trees. This has already been done in several instances, such as *Abies concolor*, *Pseudotsuga Douglasii*, and several others; the seeds of those plants brought from the warmer parts of the Pacific coast having proved of little use to us, in our changeable climate, while seeds from plants of the same species growing in Colorado under conditions similar to those in New England have produced plants which, so far, stand our climate as well as our native trees.

Besides planting the living specimens, there has been established a Herbarium; containing an abundance of specimens of woody plants, collected from various parts of the world, and plants of the same species from different localities, to aid students and others in determining the names of species and the effect of climate and location. There will also be a large collection of all kinds of woods, barks, cones, and other tree productions that may be of use in the arts or sciences. These collections are already very rich in American species, and require a great number of botanical cases to preserve them. They are at present stored in a house owned by Professor Sargent, kindly loaned by him for this purpose until such time as a proper building shall be erected on the Arboretum grounds.

The sources whence seeds are received from time to time are recorded in a set of books kept for this purpose. They are numbered in regular order, and by a systematic arrangement notes are made as to their hardiness, adaptability, usefulness, etc., which in future will be of great benefit in determining the history of these plants, and will form likewise a history of the Arboretum.

The records kept at the Arboretum show that several thousand plants are annually exchanged with individuals, botanic gardens, agricultural colleges, and other institutions, not only in this country but in Europe, Asia, North Africa, St. Helena, Japan, the Sandwich Islands, and elsewhere. So wide a dissemination of plants must be productive of good results.

The past season a Shrub Garden has been made comprising about two and one-eighth acres, laid out in beds ten feet wide, by two hundred and seventy-five feet long, sufficient in extent for 1,157 species and 357 varieties. The shrubs are systematically arranged, beginning with the order Ranunculaceæ, and ending with Smilaceæ; and not only botanically, but, as far as possible, geographically, American plants coming first. Here any one with even a limited knowledge of plants can take notes of these growing specimens, which will enable him to gain more knowledge than months or even years of study from books or catalogues could give, and will help him to make such selections as he would like to plant. All this is done at the expense of the Arboretum, thus giving all who wish to avail themselves of its privileges and advantages a real school of instruction free of all cost; and this will go on from generation to generation. No other such place is known where such valuable information can be similarly obtained; while Mr. Dawson, the skilful gardener, is always ready to impart any knowledge in his possession.

There are spaces left open for undetermined varieties, but the garden now contains 690 species and 250 varieties, with the possibility that from four to six hundred new species or varieties will be added the coming year. This location was mowing land, and was broken up only a year ago, and it is really astonishing to note what has been accomplished in so short a time; we can look upon this branch of the Arboretum work as one of the noblest educational agencies existing in any country.

Among the larger orders planted are fifty species of Spiræas and thirty-two varieties; thirty-four species of Clematis: twelve species of Euonymus and nine varieties; fifteen species of Rhamnus; fourteen species of Caragana and three varieties; forty-four species of Prunus and nineteen varieties; fifty-two species of Roses and eighteen varieties; nineteen species of Blackberries and twenty-four varieties; twenty-eight species of Philadelphus; twenty species of Ribes; fourteen species and seven varieties of Cornus; twenty-one species of Snowballs and three varieties; thirty-one species and eleven varieties of Honeysuckles; twelve species and three varieties of Huckleberries and Blueberries; sixteen species and five varieties of Rhododendrons; nine species and thirteen varieties of Ericas; and fourteen species and thirteen varieties of Lilacs.

The use of the present grounds, however, is only a temporary arrangement, the future demanding a larger and more permanent place.

The coming year will also witness much progressive work on the Public Park, in the way of planting: mostly of Coniferous trees such as Picea, Abies, Larix, and Pinus. These are to be planted in single specimens and groups. Those of the best known utility will be planted for permanent effect, while unknown varieties will be so distributed that, in case they fail or prove unsuitable, they can be removed without defacing or marring the permanent planting; the effect in landscape being also carefully looked after. It is the intention to give the preference to American trees in large groups and single specimens, while native shrubs will be planted as an undergrowth of the larger trees. For this purpose over sixty-two thousand plants were collected last fall, comprising all the best native shrubs in the New England States. Many thousands were planted in the spring of 1885, the most noticeable perhaps being at a point on the right of the entrance to the Arboretum, planted with White Pines to correspond with the magnificent Hemlock grove on the opposite side. Within the last five years miles of boundary belts have been planted, comprising all the native trees as far as possible; and a grove of *Pinus resinosa* (the Red Pine), to the number of fifty or sixty; which in ten years will make a fine appearance. This is one of the most beautiful American conifers, and is well deserving of more

general cultivation both for ornament and timber. A belt of trees facing the shrub garden is worthy of especial mention as containing many fine specimens over twenty feet high, where eight years ago was a barren sidehill. The trees have certainly made a remarkable growth, and show how many equally unpromising locations might be utilized in a most effective manner.

There is a small span roofed greenhouse devoted mainly to propagating trees and shrubs in winter, by grafting, cuttings, and seeds; from ten to fifteen thousand are produced annually. In spring they are placed thickly in boxes, and as soon as established are allowed to harden off in the frame ground. In this ground are several deep pits where the plants are stored for the first winter; every available place is used, and a look into one of the pits a few days ago revealed a surprising quantity of young plants, which will take their places in the nursery rows another season.

Among the many promising trees our attention was particularly attracted by the following deciduous kinds:

Betula alba, several fine forms.

" *nigra*.

" *papyracea*.

Catalpa bignonioides.

" *Kæmpferi*.

" *speciosa*.

Cladrastis Amurensis.

Fraxinus Americana.— A remarkably fine form of this species, with beautiful foliage, bright and shining above and glaucous beneath, was especially noticeable.

Fraxinus Mandshurica.

" *potamophylla*.— This and the preceding are from Northern Asia and Japan.

Juglans Mandshurica.—This tree was raised from seed eleven years ago, and has borne several crops of fruit.

Phellodendron Amurense.— The Amoor Cork Tree. One of the two original plants raised from seed being pistillate, and the other staminate, seed was perfected. It is believed that this is the first that has been produced in this country.

Prunus Sibirica.

Quercus Daimio.

" *macrocarpa*.

Quercus palustris.

" *Prinos.*

" *Robur* (English Oak).— Many beautiful forms.

Syringa Japonica.— A very rare species of Lilac from Japan, flowering in the middle of July; the trusses are a foot or more in length and pure white. It is a small tree rather than a shrub.

Rhus sp.— A beautiful species from Japan.

Magnolia sp.— A very promising species from Japan, which seems to be more hardy than any we have here. The seeds of this and the two preceding were contributed by President Clark of the Massachusetts Agricultural College.

Pyrus.— There is a fine collection of species from Northern Asia and Japan, which are very beautiful in flower or fruit, such as *spectabilis*, *Toringo*, and *baccata*, and their varieties.

Of the Conifers we may mention

Abies brachyphylla, from Japan.

" *concolor*, from Colorado. This is one of the finest specimens in the Arboretum.

Abies Fraseri.

" *balsamea* var. *Hudsonica.*

Chamæcyparis (*Retinospora*) *obtusa* and

" " *pisifera*, and their varieties. There is no doubt that the many varieties of this plant in cultivation came from these two original species.

Juniperus communis aurea.

Picea alba.— A variety known in the nurseries as Maxwell's Golden Spruce.

Picea alba cærulea.

" *Engelmannii.*

" *excelsa* and its many varieties.

" *pungens* and its varieties, many of which are very handsome, and being quite hardy promise to become very desirable for general ornamental planting.

Pinus Bungeana.

" *excelsa.*

" *flexilis.*

" *Jeffreyii.*

" *Murrayana.*

" *parviflora.*

Pinus ponderosa.
" *resinosa.*
" *Strobus* and its several forms.
Pseudotsuga Douglasii, the Douglas Fir or Red Fir of Oregon.

Among the shrubs were many beautiful varieties from all parts of the world, to give a description of which would take more time than our hurried visit would allow, but we hope to add many notes of the Arboretum collection in the near future. In the meantime those desiring further information are referred to the TRANSACTIONS of the Society, Part I, 1881, pp. 83–87, and Part I, 1883, pp. 79–88, as containing a fuller account of many new shrubs introduced at the Arboretum than can be found in print elsewhere.

The following extract from the Bulletin of the Bussey Institution will be of interest to all, even if the facts are known to some: "In the spring of 1872, the President and Fellows of Harvard College received a gift of $100,000 from the trustees under the will of the late James Arnold, merchant, of New Bedford, Mass., for the purpose of establishing at the Bussey Institution, a professorship of tree culture, and creating and maintaining on the Bussey estate an Arboretum, which should ultimately contain, as far as practicable, all the trees, shrubs, and herbaceous plants, either indigenous or exotic, which can be raised in the open air at West Roxbury. At least two-thirds of the income of the fund is to be accumulated until the fund amounts to at least $150,000, and the Bussey estate (Woodland Hill), in West Roxbury, passes completely into the hands of the President and Fellows of Harvard College. A particular portion of the estate has been specified as the site of the Arboretum in the indenture which defines the object and terms of the gift, — a portion which contains about one hundred and thirty-seven acres, and is the finest part of the whole estate, as regards the variety of its soils, the beauty and variety of the trees already growing upon it, and the lay of the land. An arboretum is intended to educate the public as well as the special students who resort to it. When Woodland Hill comes into the possession of the President and Fellows, the Arnold Arboretum will doubtless be laid out as an

open park, with suitable walks and roadways. It can hardly fail to become a beautiful, wholesome, and instructive resort, which will be more and more precious as the population grows denser about it."

From still another point of view, the Professorship of Arboriculture and the Arboretum are substantial additions to the University. The cultivation and preservation of forests will become in no long time a matter of national concern. The natural forests of the country are already rapidly disappearing, and wood and timber at no distant day will be scarce and dear commodities, as they have long been in many countries in Europe.

In April, 1874, Mrs. Motley conveyed all her life interest in the Bussey estate to the President and Fellows of Harvard College, so that the whole estate is now at their disposal. In 1872, the first seed was planted for the Arboretum; but at that time and up to the spring of 1879 much of the work, such as the raising of plants, seeds, and cuttings, done at the Bussey Institution, was for the Botanic Garden at Cambridge, as well as for the exchanges of the Arboretum. Since 1879, the whole time has been devoted to raising plants for the Arboretum; and the number of new and rare plants propagated has rapidly increased.

In 1875, there were one hundred and twenty-eight species raised. In 1877, Mr. Sargent wrote that, judging from the immense number of letters which were annually sent him, there was a steadily increasing interest felt in the Arboretum. It was then but five years since its establishment; but its usefulness and influence were already evident, and to its influence could be traced the planting during that year of nearly a half million trees in the New England States.

In December, 1882, an arrangement was made with the Park Commissioners of the City of Boston, which, without interfering with the scientific aims of the Arboretum, will increase its local influence by freely opening its collections to the public, and by securing for it additional and greatly needed land, suitable and dignified approaches, and carriage drives.

The objects of the Arboretum may be definitely stated in a few brief words that all can understand. First, a school of Arboriculture for the study of trees and shrubs and their uses for timber,

for ornament, and otherwise. Second, a museum of living specimens of all ligneous plants that will stand the climate at West Roxbury, planted and arranged in botanical order. Third, a museum for reference, containing a dried collection of all ligneous plants, properly labelled with the time of flowering, native location, and, if foreign, the country where they are indigenous; also a full collection of specimens of wood, bark, fruit, seeds, etc. Fourth, a library containing all the best works on Dendrology, for the use of students or others interested in the science of tree culture.

In closing this somewhat lengthy yet inadequate account of our visit to the Arboretum, we must not omit to say that its success is due to the untiring and indefatigable labors of the Director, Professor Charles S. Sargent, whose large correspondence, and thorough knowledge of all that pertains to the duties of his office, have already given to the horticultural world one of the grandest educational institutions this generation has been blessed with. We sincerely hope he may be as successful in the future as he has been in the past, in the introduction of so many of the most beautiful trees and shrubs to adorn our parks and gardens. We desire also to acknowledge the courtesy and kind attention of Mr. Jackson Dawson, the gardener at the Arboretum, who so generously gave us his time and valuable information which has enabled us to make this report.

The Committee award to Mr. Dawson a gratuity of $20 for skilful propagation and culture of hardy trees and shrubs.

Boston Asylum and Farm School.

The last visit of the season was to the Boston Asylum and Farm School for Indigent Boys, at Thompson's Island. The products of the Farm were seen at our Annual Exhibition, in the Vegetable department, to which it contributed many choice and well grown specimens. While it has not much to call attention to in a strictly horticultural way, we are glad to know and to speak of the value of this institution, its objects being to relieve and to instruct and employ indigent boys;— the education and reformation of boys who, from loss of parents or other causes, are exposed to extraordinary temptations and are very liable to become vicious and dangerous or useless members of society.

The island contains one hundred and fifty acres, of which one hundred are under cultivation, a large part of the work being done by the boys, who thus acquire a practical knowledge of husbandry. In the school the studies taught are reading, spelling, writing, written and mental arithmetic, geography, grammar, history, etc. Vocal and instrumental music are also taught, and carpenters' tools, a small forge, and a printing press with the necessary outfit, have been provided, and everything is done to make the boys a credit to the institution and themselves when they go out into the world.

The evidence of thorough training and good care of the boys is found in the fact that the Superintendent says, "Wherever we send our boys others are wanted, and the demand in late years has been greater than the supply." In justice to the institution, one thing should be mentioned: — it is not a penal or pauper establishment.

Thompson's Island, on which it is placed, is four miles down the harbor, and has proved a very healthy spot. We were surprised to see such an excellent growth of evergreen and deciduous trees, as well as a very fine orchard of pears and apples. We are greatly indebted to the excellent and justly respected Superintendent, Mr. William A. Morse, for his invitation to visit the Farm and School, and for the kind attentions which made the visit so pleasant. We take great pleasure in calling the attention of all to the good work done there, and sincerely wish that all the members of the Society may take the opportunity when offered to go and see for themselves.

In closing this Report, the Committee desire to call attention to the changes in the Schedule of Prizes, which they find it necessary to recommend in view of another season; and they sincerely hope for the coöperation of the members of the Society in encouraging those who they know are adopting specialties in the lines for which the prizes are offered, to compete for the same. They will be glad to visit any place, or to note any object of horticultural interest, whether coming within the scope of the prizes or not. They also ask attention to the Hunnewell Triennial Premiums, and hope that competitors for them may soon appear. The Committee would be grateful for any suggestions that may tend to advance the objects for which it is appointed.

We recapitulate here the awards previously mentioned:—

To Mrs. Mary E. Goddard, for the best arranged and best kept Flower Garden, the prize of . . .	$20 00
To Jonas P. Hayward, for a Vineyard of one acre, the first prize, ...	30 00
Second prize to Samuel Hartwell, ...	20 00
Gratuities:—To Samuel Hartwell, for successful culture of Melons, ...	10 00
To Jackson Dawson, for propagation and skilful culture of hardy trees, plants, and shrubs, . . .	20 00

Approved by the Committee, December 26, 1885.

John G. Barker,
E. W. Wood,
E. L. Beard,
C. N. Brackett,
Benj. G. Smith,
Henry W. Wilson,
Chas. W. Ross,
} *Garden Committee.*

REPORT

OF THE

COMMITTEE OF ARRANGEMENTS,

FOR THE YEAR 1885.

In reviewing the record of the year, this Committee, as well as the members of the Society in general, have ground for mutual congratulation that the principal exhibitions, bringing returns to the treasury, as well as those to which the public are admitted free, have proved so successful. The attendance upon the former were without precedent; and there is every reason to expect a steady growth of public interest, especially if the Society adopts a liberal policy in providing for the accommodation of exhibitors and visitors. The receipts of the Spring Show were $833.65, of the Rose Show $402.65, of the Annual Exhibition $1,184.25, and of the Chrysanthemum Show $1,119.50; — making a total of $3,540.05. Each Exhibition has shown a decided increase as to receipts over the same for the previous year, except the Rose Show, which fell a few cents behind.

This is a marked improvement; and since the Spring Exhibition and the Chrysanthemum Show, for 1886, have each been lengthened to three days in place of two, reasonable expectation can be entertained of a further advance in the receipts. There has been no marked increase of expenses in holding these large exhibitions; and in some instances they have been reduced. It is well again to reiterate the necessity for some action looking to an increase of the hall accommodations of the Society, if our large exhibitions are to continue their growth; — as the limit of our resources in this respect has been reached. It is to be hoped that the Society may be enabled to solve this question in some satisfactory manner. The Committee wish in this connection to

speak in most favorable terms of the assistance rendered them by the present Janitor of the Hall. His aid in the prompt arrangement of the various exhibitions, has been invaluable. The Committee also have liberal aid from the newspapers of the city, and their full reports of the exhibitions have been of the greatest service to us.

It is evident that the arrangements at the larger exhibitions would be greatly facilitated if some system for the preliminary entry of collections of Plants and Flowers could be adopted, and if in all cases exhibitors gave formal notice of their intention to show in certain classes. This is to be recommended in view of the great increase of exhibits, and the consequent difficulty in providing for their proper arrangement in time to open the Hall to the public. If a blank form should be adopted, and every exhibitor be required to fill up and forward this to the Committee of Arrangements a few days before each large exhibition, there would be less confusion, and the labors of the Committee would be reduced. Exhibitors would not be likely to approve this change at first; but, in a short time, the system could be made to work advantageously for all.

Another desirable innovation, which may not be received favorably, is one which would require the members of the various Committees who are on duty in the Hall, at the time of the large exhibitions, to wear some badge of office. This suggestion is prompted by the fact that, since these exhibitions have grown to such large proportions, hundreds come to our halls seeking information in regard to plants, flowers, fruits, and vegetables hitherto unknown to them. It is the duty of the Society to provide some way of making this information accessible; and, while the members of Committees have no distinguishing mark of office, our visitors, as experience has shown, do not know to whom to address their inquiries, and often leave the hall without having gratified their desire for knowledge. The course suggested might impose some trifling additional labor upon members of the Committees, but it would meet a very positive necessity, and would promote the growth of horticulture by diffusing information on the subj ct.

Respectfully submitted.

EDWARD L. BEARD, *Chairman.*

REPORT

OF THE

COMMITTEE ON THE MEETING

OF THE

AMERICAN FORESTRY CONGRESS.

The Committee appointed to extend courtesies to the American Forestry Congress make the following report:

The Congress held its sessions in the Society's large Hall, on the 22d, 23d, and 24th of September last. Distinguished gentlemen from various States of the Union and from the Dominion of Canada were present; and able papers were read, relative to the important subject of Forestry. It is believed that by these proceedings a good degree of public interest was awakened in regard to the cultivation and preservation of our Forests, as having a direct influence upon our climate, and also affecting the very quality of our soil. As the subject has such an intimate and important bearing upon the interests of horticulture, it was eminently fitting that our Society should join with others in extending hospitalities to the members of the Congress.

Visits to the Arnold Arboretum, the Middlesex Fells, and other places of interest, were made at intervals between the sessions. By the courtesy of the Mayor of Boston, a most enjoyable excursion down the harbor and a visit to the public institutions was also afforded to our guests. A visit to the extensive and instructive forest plantations of Mr. Joseph S. Fay, on the seacoast, at Wood's Holl, closed the entertainment provided for the Congress. For these courtesies a most hearty vote of thanks was passed, and especially to this Society for the use of its Hall and Rooms, and to your Committee as its representative.

WM. C. STRONG,
WM. H. SPOONER, } *Committee.*
BENJAMIN G. SMITH,

REPORT

OF THE

COMMITTEE ON PUBLICATION AND DISCUSSION

FOR THE YEAR 1885.

In compliance with the usual custom, the Committee on Publication and Discussion submit the following report:

The Committee have labored with perhaps increased diligence during the past year in promoting the interest of the weekly meetings for essays and discussions. They have been greatly aided in their work, not only by the members of the Society, but by gentlemen outside its membership, who have contributed papers replete with information and experience. Their very valuable essays, and the ensuing discussions on topics pertaining to horticulture and its kindred interests, have not only been extensively copied in horticultural papers in this country, but also in European journals.

The subjects for discussion the past year have been especially horticultural,— at the same time embracing that variety which is conducive to a proper knowledge of well-ordered gardening and planting. The discussions, following the essays, have manifested an increasing interest on the part of members; and also the greater freedom of expression that weekly practice is sure to impart.

For the result of the labors of the Committee during the past year, reference may be had to the TRANSACTIONS. These, with the valuable assistance afforded by Mr. Edward Frost to the efficient Secretary, have been completed up to date, and distributed to members and others entitled to receive them.

The Committee desire to call the especial attention of all members not already provided with the HISTORY OF THE SOCIETY, to the importance of having a copy, which can be done at a price only

sufficient to cover the cost of making the book. The sale thus far has not met the hopes and expectations of the Committee, who believe that, were the interest and value of this work sufficiently known, every member would desire to possess a copy.

Members having but partial sets of the Transactions of the Society can have those necessary for completing them as far back as 1865, by making application to the Secretary.

The Committee during the last year departed from the former plan of offering prizes for essays on given subjects, and tried that of engaging experts to prepare papers on their specialties in horticulture. In the judgment of the Committee this course has produced better results than the offer of prizes. They have expended $120 out of the appropriation of $200.

The Committee were charged by the Society with the duty of awarding the prizes offered for the best reports of the Committees to award prizes for horticultural products; and, after a careful examination of the reports submitted, have awarded the First Prize of $10 to John G. Barker, for the Report of the Committee on Gardens. The Second Prize of $8 to Edward L. Beard, for the Report of the Committee on Plants and Flowers. The Third Prize of $6 to E. W. Wood, for the Report of the Committee on Fruits.

Respectfully submitted.

O. B. Hadwen,
Francis H. Appleton, } *Committee.*
Wm. H. Hunt,

REPORT

OF THE

COMMITTEE ON THE LIBRARY,

FOR THE YEAR 1885.

There has been little in the affairs of the Library during the present year which needs especial notice. The income of the Stickney Fund and the Society's appropriation have been expended in the usual manner; the Card Catalogue has made the same progress as last year — as much, that is, as the amount expended upon it would lead us to expect; and the List of Accessions to the Library which will be published with this report will show that the rate of increase has been about the same as in former years.

Very early in the year an impression was found to exist that the library was declining in usefulness, although, year by year, it was increasing in bulk; that not only were the books less consulted but many useless ones were bought. These criticisms are such as any member has a right to make. The Committee on the Library understands that it is responsible to the Society for its acts, and that any mistake or negligence ought to be promptly noticed. It deems itself fortunate in having had ten months to consider the first of these criticisms,— that the books are less used,— for it has been able by observation and inquiry during that time to discover that such is not the case. The idea arose from the fact that the number of entries in the Librarian's record-book have decreased during the last few years; but, had the examination of these entries been carried further back, it would have been found that their number has always fluctuated, sometimes falling off to a remarkable extent in a single year, only to overrun its former limit in another year or two. For instance, in 1874 the number of books taken out was seven hundred and fifty-eight; in 1875 it was

only five hundred and two, while in three years more it had risen to seven hundred and ninety-eight. It is plain, therefore, that no inference can be drawn from two or three years' record. The largest numbers of entries are those which antedated the custom of Saturday discussions; and it is very likely that such numbers will not be again reached for some time; perhaps not at all:—the discussions to some extent supplying the information previously furnished by this library.

But this Committee does not regard the record of books taken out as being of very great importance in showing the actual use of the library, for who knows whether a book taken out is read wholly or only in part? Moreover books vary greatly in importance, yet all make the same show on the book of entries. We base our opinion that the library is more used from year to year upon the very great increase of study and reading in the library room. To determine this point we have made very frequent observations and inquiries, and all the evidence is toward one conclusion,— that which we have just pronounced.

The second of the criticisms to which we have referred,—that many useless books are bought,— is easily met. Any book is useless to him who has no use for it, and we have probably no member who cares to use *every* book in the library; but he must be a very reckless person who shall use the word in its broad sense, and declare that any book we have is of no use to any one.

Probably this criticism arises from the fact that many books are bought whose bearing upon practical horticulture is not very apparent, such as herbals, floras of various countries, monographs of natural orders of plants, works on systematic botany, geographical distribution, and the like. In explanation, we can state that we watch publishers' announcements, book notices, etc., closely, and neglect nothing that appears to be of a so-called "practical" nature and worth procuring; also that we have bought every book that has been asked for during the year, whenever we could without disobeying the wise restrictions imposed by Mr. Stickney. If any of these purchases appear, to some, superfluous, they should remember that a large proportion of our members are persons whose interest in horticulture is of a scientific or literary nature only, and so long as these members pay their assessments, they have a perfect right to expect that their tastes and wants shall be considered.

There is probably no library, above the level of circulators of fiction, which has not many books that have never been opened since the day they were bought, but all such are only waiting their time; for them the hour may come, and the man, by whom and in which they may be found almost indispensable.

If exception be taken to some of our books on the ground of their being in foreign languages, it must be borne in mind that most of these have illustrations which anybody may understand; and that there are not more than two works in languages not familiar to many of our members. One of the two is in Russian,—it cost us nothing, being a gift; the other is Japanese and consists almost entirely of plates.

The exhibitions of this Society are models of their kind; our prize lists are of unexampled liberality; our discussions, beside being attended by as many as this room will hold, are frequently reprinted in foreign journals: we believe that our library is an agency not inferior to either of these in causing the Society to be respected and appreciated; containing, relatively to its size, a peculiarly valuable collection of books, and being open freely to any one who desires to study here.

There is one more subject upon which our duty will not allow us to be silent, although it is the very familiar one of library accommodations. Everybody can see the state of affairs. Books crowded and jammed into receptacles which can properly hold not more than two-thirds of their present contents: others, very valuable and useful ones, put into cases at the top of the librarian's room, difficult to reach by the really dangerous ladder, and almost impossible to be taken down; others stowed in an upper room, and of no use at present because of their inaccessibility.

This Committee has taken great pains to inquire into the best way of obviating the difficulty. Plans and estimates have been secured, consultation has been had with a competent architect, and yet the end of the year finds us worse off than the beginning. It is absolutely necessary that something be done.

For the Committee,

W. E. ENDICOTT, *Chairman.*

LIBRARY ACCESSIONS.

Books Purchased.

Gray, Asa, LL.D., etc. Synoptical Flora of North America. Vol. 1, Part 2. Large 8vo. New York, London, and Leipsic: 1884.

Hemsley, W. B. Biologia Centrali-Americana. Parts 18 and 19, February and November, 1885, in continuation. 4to. 6 plates. London.

Martius, C. F. P. de. Flora Brasiliensis, etc. Fasc. 93, in continuation. Folio. Plates. Leipsic: 1885.

Hooker, Sir William Jackson, K. H., D. C. L. Oxon., F. R. A., and L. S., etc. The British Ferns, or Coloured Figures and Descriptions, etc., of the Ferns of Great Britain and Ireland. With drawings by Waldo Fitch, F. L. S. 8vo. 66 colored plates. London: 1861.

Willkomm, Maurice. Illustrationes Floræ Hispaniæ, Insularumque Balearum. Livraisons 7–10, completing tome 1. 4to. 36 colored plates. Stuttgart: 1883.

Pierre, L., Directeur du Jardin Botanique de Saïgon. Flore Forestière de la Cochinchine. 7e fascicule, in continuation. Large folio. 15 plates. Paris: 1885.

Hamilton, Francis, M. D , F. R. S., and L. S. Commentary on the Hortus Malabaricus. 4 pamphlets. 4to. [Extracts from the Transactions of the Linnean Society.]

Baldwin, Henry. Orchids of New England. A Popular Monograph. 8vo. 40 wood-cuts. New York: 1884.

Fitzgerald, R. D., F. L. S. Australian Orchids. Parts 7 and 8, in continuation. Large folio. 20 colored plates. Sydney, New South Wales: 1882.

Mueller, Baron Ferd. von. Eucalyptographia; 10th decade, completing the work. 4to. 10 plates. Melbourne: 1884.

Lambert, Aylmer Bourke, F. R. S., etc., etc. An Illustration of the Genus Cinchona; embracing also dissertations, etc., by Baron de Humboldt, Laubert, and Don Hippolite Ruiz, on Cinchona Forests, Species of Quinquina, and various Medicinal Plants of South America: and an account of the Spikenard of the ancients. 4to. 5 plates. London: 1821.

Naudin, Ch. Recherches sur les Cucurbitacées. [Extraits des Annales des Sciences Naturelles.] 8vo. 21 plates. Paris: 1856–1866.

Klotzsch, J. F. Begoniaceen Gattungen und Arten. 4to. 12 plates. Berlin: 1855.

Nicklès, Napoléon, pharmacien. Notice sur les Gladiolus de France et d' Allemagne. 4to. pamphlet. 1 colored plate; n. d.

Trinius, Karl Bernhard. Species Graminum iconibus et descriptionibus illustratæ. 3 vols. 4to. 360 plates. St. Petersburg: 1828.

Palisot de Beauvois, A. M. F. J., Membre de l'Institut, etc. Essai d'une nouvelle Agrostographie; ou nouveaux genres des graminées; avec figures representant les caractères de tous le genres. 8vo., with 4to. atlas of 25 plates. Paris: 1812.

Reichenbach, Ludovico. Iconographia Botanica Exotica, sive Hortus Botanicus, imagines plantarum imprimis extra Europam inventarum colligens, cum commentario succincto editus. 4to. 250 colored plates. Leipsic: 1827–1830.

Dodoens, D. Rembert. A Nieuwe Herball, or Historie of Plantes: the whole discourse and perfect description of all sortes of Herbes and Plantes. Translated from the French by Henry Lyte, Esquyer. Black Letter folio. Many wood-cuts. London: 1578.

Goodale, George Lincoln, A. M., M. D. Physiological Botany [to form vol. 2 of "Gray's Botanical Text Book"]. Part 1. Outlines of the Histology of Phænerogamous Plants. 8vo. New York and Chicago: 1885.

De Bary, Dr. A., Professor, etc. Comparative Anatomy of the Vegetative Organs of the Phanerogams and Ferns. Translated and annotated by F. D. Bower, M. A., F. L. S., etc., and D. H. Scott, M. A., Ph. D., etc. 8vo. 241 wood-cuts. Oxford: 1884.

Sketches of the Physiology of Vegetable Life. By the authoress of "Botanical Dialogues." 8vo. London: 1811.

Smith, Lady, Editor. Memoir and Correspondence of the late Sir James Edward Smith, M. D., F. R. S., etc., etc. 2 vols. 8vo. With engraved frontispiece. London: 1832.

Pratt, Anne. Haunts of the Wild Flowers. With illustrations. 16mo. London and New York: n. d.

Catlow, Agnes. Popular Garden Botany; containing a familiar and scientific description of most of the hardy and half-hardy plants introduced into the flower-garden. Square 12mo. 20 colored plates. London: 1855.

Linnean Society, Journal of the. Vol. XX, Nos. 130, 131. Vol. XXI, Nos. 132–139, in continuation. 8vo. London: 1884, 1885.

Miller, William. A Dictionary of English Names of Plants, applied in England and among English-speaking People to Cultivated and Wild Plants, Trees, and Shrubs. In two parts, English-Latin and Latin-English. 8vo. London: 1884.

Knight, Thomas Andrew. A selection from his Physiological and Horticultural Papers, published in the Transactions of the Royal and Horticultural Societies. With a sketch of his Life. 8vo. Portrait and plates. London: 1841.

Hooker, Sir William Jackson. Copy of a letter addressed to Dawson Turner, Esq., F. R. A. and L. S., etc., etc., on the occasion of the death of the late Duke of Bedford, particularly in reference to the services rendered by His Grace to Botany and Horticulture. Printed for private distribution. 4to. Colored plate. Glasgow: 1840.

Candolle. Alphonse de. Origin of Cultivated Plants. Small 8vo. London: 1884.

Warner, Williams, and Moore's Orchid Album. Vol. 4, Parts 43–48; Vol. 5, Parts 49–52, in continuation. 4to. 40 colored plates. London: 1885.

Lindenia; Iconographie des Orchides. 1ere volume, 1ere livraison (mensuelle), J. Linden, Directeur. Small folio. 4 colored plates. Gand: mai, 1885.

Curtis, Henry. Beauties of the Rose. Volume 2. 4to. 18 colored plates. Completing the work. London and Bristol: 1853.

The Rosarian's Year-Book, for 1885. Small square 8vo. London: 1884.

Lemaire, C. Le Jardin Fleuriste, journal général des progrès et des intérêts horticoles et botaniques, etc. 4 vols. large 8vo. Woodcuts and many colored plates. Gand: 1851–1854.

Baines, Thomas. Greenhouse and Stove Plants, Flowering and Fine-Leaved Palms, Ferns, and Lycopodiums; with full details for propagation and cultivation. 8vo. London: 1885.

Hogg, Robert, LL.D., F. R. S., etc. The Herefordshire Pomona, containing colored figures and descriptions of the most esteemed kinds of Apples and Pears cultivated in Great Britain. Part 7, completing the work. Folio. London and Hereford: 1884.

Salisbury, William. Hints, addressed to Proprietors of Orchards, and to growers of fruit in general. 12mo. 2 plates. London: 1816.

Fruits, Nuts, and Wine. By various writers. 8vo. pamphlet, pp. 315–450. Colored plate. [From the Report of the U. S. Patent Office, 1856.]

Roessle, Theophilus. How to cultivate and preserve Celery. Large 8vo. 4 colored plates. Albany: 1860.

Pennsylvania Horticultural Society. Transactions. 1 vol. 8vo. Philadelphia: 1839–1844.

Indiana State Horticultural Society. Annual Report; Proceedings of the Ninth annual session, held at Indianapolis, January 4–6, 1870. 8vo. Indianapolis: 1870.

Gerard, John. A Catalogue of Plants cultivated in his garden in the years 1596–99. Edited, with notes, references to Gerard's Herball, the addition of modern names, and a memoir, by Benjamin Daydon Jackson, F. L. S. 4to. Privately printed. London: 1876.

Royal Gardens at Kew, Reports on the progress and condition of, for the years 1876, 1878, 1879, 1881 and 1882. 5 pamphlets, 8vo. London.

Chelsea Botanick Garden,—Memoirs, Historical and Illustrative, of the. 8vo. London: 1820.

Brooke, E. Adveno. The Gardens of England. Large folio, with many vignettes and colored plates. London: 1857.

City of Boston, Report, and accompanying statements and communications relating to a Public Park for: being City Document No. 123, 1869. Also, No. 15, 1879; No. 118, 1880, with chart; Nos. 23, 124, 1881; No. 148, 1882 and No. 150, 1883, relating to the same.

Brooklyn Park Commissioners, Twelfth and Thirteenth Annual Reports. 2 pamphlets, 8vo. Plates. Brooklyn: 1872, 1873.

Fairmount Park, Philadelphia, Description of Plan for the Improvement of, by Sidney & Adams: adopted by City Councils. 8vo. pamphlet. Philadelphia: 1859.

——— ———. Fourth Annual Report of the Commissioners of. 8vo. pamphlet, with plates. Philadelphia: 1872.

Scottish Arboricultural Society, Transactions of the, for the years 1857–1880. 9 vols. 8vo. Plates, etc. Edinburgh.

Forestry and Forest Products: prize essays of the Edinburgh International Forestry Exhibition, 1884: edited by John Rattray, Botanist to the Scottish Marine Station, and Hugh Robert Mill, Chemist to the same. 8vo. Many cuts and plates. Edinburgh: 1885.

Liebmann, F. M. Chênes de l' Amerique Tropicale. Iconographie des espèces nouvelles ou peu connues (ouvrage posthume, achevé et augmenté d' un aperçu sur la classification des chênes en général, par A. S. Oersted). Folio. 47 plates. Leipsic: 1869.

Arboretum Segrezianum: Icones Selectæ Arborum et Fruticum in Hortis Segrezianis collectorum. Livraison 6, completing the work. Folio. 6 plates. Paris: 1885.

Maximowicz, C. J., Socius Academiæ. Rhododendreæ Asiæ Orientalis: forming Tom. 16, No. 9, of "Memoirs de l' Académie Imperiale des Sciences de St. Petersbourg." 7th series. 4to. pamphlet. 4 plates. St. Petersburg: 1870.

American Agriculturist. Vols. 1 and 2, bound together, and Vols. 9 and 10, bound together; being for the years 1842 and 1843, 1850 and 1851, 8vos, — also, Vol. 23, 1864, 4to. Illustrated. New York. [Towards completing the set].

Journal of the New York State Agricultural Society. Vol. XI, Nos. 1, 4, 7, 9: also Vol. XII, No. 12. Albany: 1860 and 1862. [Towards completing the set].

Agricultural Review and Journal of the American Agricultural Association. Quarterly. January, 1882. Vol. 2. No. 1. New York. [Towards completing the set].

The Semi-Tropical, a monthly journal, devoted to Southern Agriculture and Horticulture and to Immigration. Vol 1, Nos. 1 and 3, for September and November, 1875. Jacksonville, Florida. [Towards completing the set].

Ontario School of Agriculture and Experimental Farm. Third Annual Report, for the year ending December 31, 1877. Large 8vo. Toronto: 1878. [Towards completing the set].

Royal Agricultural Society of England. Journal. Second Series. Vol. 20, Part 2, October, 1884, and Vol. 22, 1885. 8vo. London.

Christy, Thomas, Jr., F. L. S. Forage Plants, and their economic conservation by the new system of "Ensilage." Part 1, Caucasian Prickly Comfrey; Part 2, Balsamocarpon, and other plants containing Tannin. 8vo. pamphlet. 2 colored plates and wood-cuts. London: 1877.

Christy, Thomas, F. L. S., F. S. C. I., etc. New Commercial Plants and Drugs. No. 8, in continuation. 8vo. Wood-cuts and colored plate. London: 1885.

Cooke, M. C. Illustrations of British Fungi. Parts 26–36, in continuation. 8vo. Colored plates 405–580. London: 1884, 1885.

Lesquereux, Leo, and Thomas P. James. Manual of the Mosses of North America: with six plates, illustrating the genera. 8vo. Boston: 1884.

Walsh, Benjamin D., State Entomologist. First Report on the Insects injurious to vegetation in Illinois. 8vo. pamphlet, 1867.

United States Consular Reports. Nos. 8 and 14, June and December, 1881. Nos. 16 and 18, February and April, 1882. Reports from the Consuls of the United States on the Commerce, Manufactures, etc., of their Consular Districts. Published by the Department of State. 4 pamphlets. 8vo. Washington: 1881, 1882. [Towards completing the set].

Books, Etc., Received by Donation and Exchange.

Thomas, John J. The American Fruit Culturist: Revised Edition. 12 mo. 519 wood-cuts. New York: 1885. The Author.

Strong, W. C. Fruit Culture, and the Laying Out and Management of a Country Home. 12mo. 34 wood-cuts. Boston: 1885. The Author.

Green, Charles S. How to Propagate and Grow Fruit. 8vo pamphlet. 2 colored plates, 50 wood-cuts. Rochester: 1885. The Author.

Hogg, Robert, LL.D., F. L. S., etc., etc. The Fruit Manual: a Guide to the Fruits and Fruit Trees of Great Britain. Fifth Edition. 8vo. London: 1884. The Author.

Barron, A. F., Superintendent of the Royal Horticultural Society's Gardens, Secretary to the Fruit Committee, and of the National Apple Congress, etc. British Apples: Report of the Committee of the National Apple Congress, held in the Royal Horticultural Gardens, Chiswick, October 5–25, 1883. 8vo. pamphlet. London: 1884. The Royal Horticultural Society.

Les Vignes Americaines; Catalogue Illustré et Descriptif, avec des brèves indications sur leur culture, par MM. Bush et fils et Meissner, viticulteurs a Bushberg, Jefferson County, Missouri; ouvrage

traduit de l'anglais, etc. Montpellier and Paris: 1876. Also the 2d French edition, with 3 colored plates and 149 wood-cuts. 1885. Also an Italian edition. Castellanza and Busto Arsizio. 1881. 3 large 8vo. pamphlets. Isidor Bush.

Winchester Record, The. Vol. 1, Numbers 1, 2, and 3, for January, April, and July, 1885. Printed by the Winchester (Massachusetts) Historical and Genealogical Society. 3 pamphlets. 8vo. [No 3 contains articles on the History of the Baldwin Apple, by Rev. Leander Thompson and others.] Waldo Thompson.

Blodget, Lorin. The Principles of Fruit Preservation, as illustrated in the Fruit Preserving House of N. Hellings, Esq., near Bristol, Pennsylvania. 8vo. pamphlet, with photograph. Philadelphia: 1868. Mrs. Isabella James.

Power, Mrs. S. D. Fruit Pastes, Syrups, and Preserves. For Housekeepers and Fruit Growers. 8vo. pamphlet. Boston: 1885. The Author.

Paul, William, F. L. S., etc. Roses and Rose Culture. 5th edition. 12mo. London: n. d. The Author.

——— ——— ———. Observations on the Cultivation of Roses in Pots:—including the Autobiography of a Pot-Rose. Sixth edition, illustrated, 12mo. London: n. d. The Author.

——— ——— ———. The Rose Annual, for 1858–59, forming a continuation of the "Rose-garden and Supplement." 2 pamphlets. Royal 8vo. 4 colored plates. Completing the set. London. The Author.

——— ——— ———. American Plants; their History and Culture, with full descriptions of the best varieties. 12mo. Illustrated. London and Cheshunt: 1858. The Author.

——— ——— ———. Lecture on the Hyacinth: delivered by request of the Council of the Royal Horticultural Society, April 5, 1864, at South Kensington. 12mo. pamphlet. The Author.

Eley, James Norman. The American Florist; or, A Guide to the Management and Cultivation of Plants in Conservatories, Greenhouses, Rooms, and Gardens; to which are added Directions for the Culture of Annual, Biennial, and Perennial Flowers, Trees, Shrubs, Bulbs, etc., etc. 16mo. Hartford: 1845. J. D. W. French.

Essex Agricultural Society. Report of the Committee on Flowers, by John Robinson. [Extract from the Transactions for 1884.] 8vo. pamphlet. Salem: 1884. The Author.

Begonias, Photograph of Single and Double Tuberous Rooted, grown by Charles B. Brigham, M. D., San Francisco. Dr. Brigham.

California Fan Palm (*Washingtonia robusta*), Photograph of one raised from seed at Federal Point, Florida. Edmund H. Hart.

Cobbett, William. A Treatise on Cobbett's Corn. 12mo. 3 plates. London: 1828. S. L. Boardman.

Sturtevant, E. Lewis, M. D. Kitchen Garden Esculents of American origin. [Extracts from the American Naturalist, 1885, pp. 444–457, 542–553, 658–669.] 8vo. pamphlet. The Author.

Palmer, Julius S. Mushrooms of America, edible and poisonous. Imp. 8vo. 12 colored plates. Boston: 1885. The Author.

Flax and Hemp Spinners and Growers' Association, Report to the, April 22, 1885. 8vo. pamphlet. Boston: 1885. A. R. Turner, Jr.

Gregory, Hon. J. J. H. Fertilizers. Where the materials come from, etc. 12mo. pamphlet. Boston: 1885. The Author.

Wagner, Professor, Ph. D., etc. Recent investigations on the subject of Manures. Third revised edition. Translated by J. L. S. Bengough. 8vo. pamphlet. Darmstadt: 1885. The Comité Salitrero, Iquique, Chili.

Paul, William, F. L. S., etc. Villa Gardening. Third edition, illustrated. 12mo. London: n. d. The Author.

Joly, M. Ch. Note sur la nouvelle Serre a Palmiers de Glasnevin. 12mo. pamphlet. Wood-cuts. n. d. The Author.

Science et Nature. Journal Illustrée. No. 105, containing an account of the new greenhouses of the Jardin des Plantes. Wood-cut. Royal 8vo. pamphlet. Paris: November, 1885. M. Ch. Joly.

Sturtevant, E. Lewis, M. D. An observation on the hybridization and cross-breeding of plants. Leaflet. [Extract from American Naturalist, November, 1885. 8vo. pp. 1040–1044.] The Author.

Crozier, A. A. The Modification of Plants by Climate. 8vo. pamphlet. Ann Arbor, Michigan: 1885. The Author.

The American Garden. 14 numbers, 4to., 1876–1884. [Towards completing the set.] George W. Humphrey.

The Semi-Tropical: a monthly journal, devoted to Southern Agriculture and Horticulture; and to Immigration. Vol. 1. No. 4. December, 1875. [Towards completing the set.] Hon. Harrison Reed.

The American Seedsman: a magazine and directory. Vol. 1. No. 8. June, 1885. 8vo. pamphlet. La Plume, Pennsylvania. I. F. Tillinghast, Publisher.

L' Acclimation Illustrée, June 10 and 20, 1882, June 8 and December 14, 1884. 3 pamphlets, 4to. 2 colored plates. Bruxelles Édouard de Wael, Directeur.

Gazetta del Contadino, November 25 and December 10 and 25, 1884. 3 pamphlets, 4to. Acqui, Italy. M. H. Barilati.

Watson, Sereno. Contributions to American Botany, XII. I., A History and Revision of the Roses of North America. II., Descriptions of some new species of Plants: chiefly from our Western Territories. [From the Proceedings of the American Academy of Arts and Sciences, Vol. XX. Issued Feb. 21, 1885.] The Author.

Macoun, John, M. A., F. L. S., F. R. S. C., Botanist to the Geological and Natural History Survey of Canada. Catalogue of Canadian Plants. Part 2. Gamopetalæ. 8vo. pamphlet. Montreal: 1884.

Appalachia. Vol. 4, No. 1, December, 1884. 8vo. pamphlet. Boston. Charles E. Ridler. [Contains articles on the Flora of Willoughby Notch, etc., by Mr. Ridler.]

Robinson, John. Botany in Essex County: a paper read before the Essex Institute at Topsfield, June 18, 1884, the Fiftieth Anniversary of the Formation of the Essex County Natural History Society. [From the Bulletin of the Essex Institute. Vol. 16. 1884.] 8vo. pamphlet. Salem: 1884. The Author.

University of the State of New York, Nineteenth Annual Report of the Regents of, on the condition of the State Cabinet of Natural History; and the Historical and Antiquarian Collection annexed thereto. 8vo. pamphlet. Albany: 1866. Two copies. Mrs. Isabella James. [Contains List of Mosses and other Plants of the State.]

Hansen, Docent Carl. Plantegeografiske Bemærkninger. 8vo. pamphlet. Copenhagen: 1885. Two copies. The Author.

Matsumara, J., Assistant Professor of Botany in the University of Tokio, Nippen Shokubutsumeii, or Nomenclature of Japanese Plants in Latin, Japanese, and Chinese. Supervised by R. Yatabe, Professor of Botany in the University of Tokio. 8vo. Tokio, Japan, 2544 (1884). Francis Skinner.

Moore, Charles, F. L. S., etc., director of the Botanic Gardens, Sydney. A Census of the Plants of New South Wales. Large 8vo. Sydney: 1884. Francis Skinner.

Montreal Horticultural Society and Fruit Growers' Association of the Province of Quebec. Tenth annual report, for the year ending November 30, 1884. Proceedings of annual meeting, December 18. 8vo. pamphlet. Montreal: 1885. The Society.

Worcester County Horticultural Society. Transactions for A. D. 1884, with the Premium Schedule for 1885. 8vo. pamphlet. Worcester: 1885. Edward W. Lincoln, Secretary.

New York Horticultural Society, Reports of the. December, 1884; February, March, May, and November, 1885; and the Premium List of the Chrysanthemum Show for 1885. James Y. Murkland, Secretary.

American Institute of the city of New York. Program and Premium List of the Exhibition of Strawberries, Roses, Orchids, etc., June 18 and 19, 1885. F. M. Hexamer, M. D.

Pennsylvania Horticultural Society, Act of Incorporation and By Laws. Transactions for the year 1865. 2 pamphlets, 8vo, Philadelphia: 1861 and 1866. Programmes for the years 1868, 1869, 1872, and 1874. 3 pamphlets 12mo., and one 8vo. Mrs. Isabella James. Also, Act of Incorporation and By Laws, and a Programme and Calendar for 1885. 2 pamphlets, 12mo. A. W. Harrison, Secretary.

Pennsylvania State Horticultural Association. Report of the Twenty-fourth Annual Meeting, January, 1883. 8vo. pamphlet. Colored plate, and wood-cuts. Harrisburg: 1884. Also, Report for the year 1884, together with Reports of the State Board of Agriculture, the State Agricultural Society, the State Dairymen's Association, and the State College: — in one vol. entitled Agriculture of Pennsylvania. 8vo. Harrisburg: 1885. E. B. Engle, Secretary. Six copies.

Georgia State Horticultural Society. Fifth, Sixth, and Eighth Annual Meetings. Three pamphlets, 8vo. Atlanta: 1880, 1881, and 1883. P. J. Berckmans, President.

Ohio State Horticultural Society. Eighteenth Annual Report, for the year 1884–5. 8vo. pamphlet. Columbus: 1885. George W. Campbell, Secretary.

Indiana State Horticultural Society. Transactions for the year 1884, being the Proceedings of the Twenty-fourth Annual Session; with Reports from local societies, Essays, Papers, etc. 8vo. Indianapolis: 1885. C. M. Hobbs, Secretary.

Illinois State Horticultural Society. Transactions for 1884; also Proceedings of district societies, and various horticultural societies in the State. New Series. Vol. 18. 8vo. 2 portraits. Published by the Society. Six copies. A. C. Hammond, Secretary.

Missouri State Horticultural Society. Report for the year 1884, being a report of the workings of the Society for the year, together with the papers and discussions at the Twenty-seventh Annual Meeting, held at St. Joseph, December 9, 10, and 11, 1884: — also a report of the Semi-Annual Meeting held at Springfield, June 10 and 11, 1885. 8vo. Jefferson City: 1884. L. A. Goodman, Secretary. Fifteen copies.

Kansas Horticultural Report, for the year 1884. Proceedings of the Fourteenth Semi-Annual, and Eighteenth Annual Meetings of the State Horticultural Society. Vol. 14. 8vo. Topeka: 1885. Also, Fruit Crop Report, of July 1, 1885, 12mo. pamphlet. The Society.

Michigan State Horticultural Society. Fourteenth Annual Report of the Secretary, for the year 1884. 8vo. Lansing: 1885. Ten copies. Charles W. Garfield, Secretary.

Wisconsin State Horticultural Society. Transactions. Vols. 14 and 15, 1883–4, and 1884–5. 8vo. Madison: 1884, 1885. William Trelease, Secretary.

Minnesota State Horticultural Society. Annual Report for the year 1885. Vol. 13. Prepared by S. D. Hillman, Secretary. 8vo. St Paul: 1885. The Secretary.

Nebraska State Horticultural Society. Annual Reports, 1878 and 1879. 8vo. with map. Lincoln: 1879. James T. Allan, Secretary.

California State Board of Horticulture. Biennial Report, 1883–1884. 8vo. Sacramento: 1884. A. H. Webb, Secretary.

Nova Scotia Fruit Growers' Association and International Show Society. Transactions and Reports, 1885. 8vo. pamphlet. Halifax: 1885. C. R. H. Starr, Secretary.

Ontario Fruit Growers' Association. Report for the year 1884. 8vo. pamphlet. Toronto: 1885. 5 copies. D. W. Beadle, Secretary.

California State Viticultural Convention. Report of the Third Annual Convention, held December, 1884. Large 8vo. pamphlet. Published by the "San Francisco Merchant." The Publishers.

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REPORT

OF THE

SECRETARY AND LIBRARIAN,

FOR THE YEAR 1885.

In presenting to the Society this annual report as Secretary, I rely upon the knowledge and daily observation of its active members as a supplement to the following suggestions, concerning the extent and character of the duties attaching to the office as matters of ordinary routine.

It will not be unreasonable if we assume that, in general, the Secretary's routine is necessarily extended in like proportion with the broadening scope, and increasing variety, of the work carried on in all departments,—otherwise the neglect would make itself promptly known in various ways, that seem thus far to have been fairly well avoided.

The Constitution and By Laws set forth the outlines, and also some specific features, of duties to be performed in matters of record, correspondence, and notification, and in the audit and examination of bills contracted. No essential matters of this description, it is believed, have suffered from neglect during the year, or now remain seriously in arrears. Yet it is to be said that certain matters, which have not come into existence all at once, but have grown up by degrees, and now appear in the character of important requirements, are at present unfinished, though in a hopeful stage of advancement.

Of these, one which may be mentioned relates to the List of Annual and Life Members; forming a part of the Society's annual publications. The Secretary assumes a duty not defined or directly suggested by the By Laws (unless under his general responsibility for whatever is published), in pursuing from time to

time, as opportunity offers, the very necessary task of revising and correcting this list; which constitutes a very important portion of the Society's records. From the necessity of his situation, having need to communicate, as occasion may require, with individual members, he finds that all changes of residence and discontinuance of membership by death or otherwise, are matters to which his attention ought to be given.

Heretofore, as far as possible — but without especially devoting time to it, and under urgent call at all times for other needed work, — he has prosecuted inquiries on all convenient occasions; and supplied the revisions ascertained to be needed. Recently this work has engaged his attention more especially, as a matter of growing urgency.

It had long been suspected that the List of Members stood in need of revision, but on systematically undertaking it, the need was found much greater than had been previously supposed. Its necessity may be judged of from the fact that there are now on the list the names of about fifty members, who, when last heard from, were residents of Boston, but whose names are not now to be found in the Boston Directory. On the other hand, the Directory contains the names of as many more, who when last heard from were not residents of this city; raising the question whether such members have removed to Boston, but not deciding it, since there may have been two persons of the same name. A request is every year printed, at the head of the list of members, for prompt information in regard to change of residence or any inaccuracies; but this request is seldom heeded. The present Treasurer, as well as his predecessor, has kept careful watch over the list of members, but notwithstanding all these efforts it is found that a large number of changes have been made, which have not come to the knowledge of either the Treasurer or the Secretary.

Inasmuch as the facts in question are often difficult to ascertain decisively, and since experience has shown that, even under the strongest probabilities, it is hazardous to change the record until direct and positive evidence is secured from those having a personal knowledge, the Secretary particularly invites the coöperation of members in this work. Almost every one might furnish more or less aid in collecting the required information, and in view of

coming publications, in which the list will reappear, it is earnestly requested that all members will carefully examine it and report to the Secretary such changes as may be found necessary.

Notice has been given, by circulars addressed to all the members not known to be supplied, that copies of the official HISTORY OF THE SOCIETY, published in 1880, may be had by any desiring them. It was in addressing these circulars that the urgent necessity for a revision of the list became apparent. The purely incidental way in which this task of reviewing the record of membership has arisen and grown into a pressing duty of considerable magnitude is very suggestive. It is typical of many other demands upon the Secretary, created by a variety of other subjects.

These it would be tedious to enlarge upon. They originate from the character of his office as the natural executive channel for a variety of matters arising in the ordinary working of the Society, or in the maintenance of its relations to the public, and to sister societies. To state them in a manner at once concise and comprehensive is probably impossible; they are here barely alluded to with a confident belief that, to all who give the matter reflection, a further discussion would be superfluous.

The literary work, like the routine business, can scarcely be detailed — only outlined; but being put into a visible form, it may be said, in a manner, to speak for itself.

It is a gratifying circumstance that, owing to the valuable aid opportunely extended early in the year, in providing the services of an able general assistant in the Secretary's office, employed in this and other departments of its manifold duties, the Society's TRANSACTIONS and other publications are fully brought out up to date.

It is a further gratification to remark the fact,— due, of course, chiefly to the intrinsic value of the essays and discussions, but perhaps also in some important degree to the care bestowed in their preparation for the press,— that there has been an evidently increased consideration accorded to them, both among members of the Society and the general public. Extracts, in greater number and at greater length than in previous years, have been republished in the columns of leading journals both at home and abroad.

In the last report of the Secretary, mention was made of some inquiries as to the aid afforded by various States for the advance-

ment of horticulture; and some of the results of these inquiries were given. At the time these researches were made, the Report for 1884 of the California State Board of Horticulture had not been received; but it has since been added to our library, and the Secretary of the Board has called attention to the fact that the amount appropriated by the State of California for the promotion of horticulture is larger than in any other state. It seems therefore only just to add in this place, to the statement made last year, that in each of the years 1883 and 1884 California's appropriation for this purpose was $5,000, and that for the present year it is $10,000; while besides this the state appropriates $15,000 for the Viticultural Board, $5,000 for experimental and scientific work in regard to viticulture, and $2,500 for the State Forestry Commission.

In addition to matters already treated of, the Secretary is charged with the duties of Librarian, which he performs under the immediate direction of the Library Committee. In the report of that Committee, accordingly, may be found a more complete treatment than here, of all matters involved in the use, present condition, plans of enlargement, and future prospects of this most valuable and distinguishing possession of our honored Society. Such is the rank which must be accorded to it in view of the present extent and quality of its peculiar literary treasures, its resources by way of endowment, and the estimation placed upon it by those devoted to studies promotive of the special objects of our Society.

Statistics of circulation are out of the argument as regards a library whose maintenance insures the preservation of the best fruits of advanced research, in a repository accessible to scholars and students. As has been well said by competent judges, treating of a "library for advanced students, or for persons making researches of a learned nature" — "the benefit reaped from it by the community cannot be reckoned by any method of statistics. It is by means of such collections as this that some of the greatest benefactors of the public are enabled to prosecute their researches and to do their work."

Decidedly the most valuable part of our library consists of books by no means adapted or intended for general circulation. We supply a fair, and, on the whole, a nearly indispensable part

of the current reading of our best practical horticulturists. We divide that field, as a matter of course, with agricultural and horticultural publications which members procure, for home reading, in other ways. But the books by the possession of which this Society enjoys an enviable prestige, and which make its library the prized resort of scholars in, and lovers of, the ever advancing art of horticulture, are of a class whose utility is to be measured, if at all, by another standard than that of more or less extensive circulation.

For many years the need of additional accommodation has been pressed upon the attention of the Society, in the reports both of the Library Committee and the Librarian. An impression prevails, in the minds of some, that the crowded state of the bookcases causes inconvenience, and adds to the labors of the Librarian, only when a book is wanted for use; and it seems desirable to correct this not unnatural misapprehension. Not alone when a book is called for, but daily and continually there is need, for every volume, of a place where the Librarian can swiftly and surely lay hand upon it. However infrequently consulted, all books kept as the property of the Society should be so shelved as to be familiar to him, both as to contents and position,—to the end that each new book arriving may promptly take its right place, in right relations to the rest.

Failing this, classification is simply impossible, and disorder and perplexity must increase in a constantly advancing ratio. Let him do his best and struggle his hardest, the odds are against him and are daily growing greater; his most strenuous endeavors cannot meet and overcome the confusion inevitably entailed by over-crowded shelves, and compulsory stowage in widely separated and inaccessible places.

ROBERT MANNING,

Secretary and Librarian.

TREASURER'S REPORT,

FOR THE YEAR 1885.

RECEIPTS.

Cash on hand, as per last report,			$6,795 78
Rent of Halls,			6,404 61
Rent of Stores,			12,825 36
Admissions and Assessments,			1,074 00
Library — Sale of Book,			15 00
Sale of History,			94 50
Mount Auburn Cemetery,			2,713 53
Annual Exhibitions,		$3,540 05	
Less Expenses,		1,009 74	
			2,530 31
Estate of Benjamin B. Davis,			500 00
			$32,953 09

EXPENDITURES.

Labor,		$1,246 79	
Salaries,		2,825 00	
Incidentals,		217 79	
Interest Paid,	$2,550 00		
Less amount received,	709 19		
		1,840 81	
Heating and Water (less paid by Tenants),		301 63	
Taxes,		1,536 52	
Repairs on Building,		636 08	
Lighting,		733 90	
Furniture and Fixtures,		59 68	
Prizes,		3,500 60	
Committee of Arrangements,		394 80	
Stationery, Postage, and Printing,		1,449 34	
Stickney Fund,		700 02	
Carried forward,		$15,442 96	

Brought forward, ...	$15,442 96	
Library, ...	315 00	
Card Catalogue, ...	100 00	
Sinking Fund, ...	11,233 56	
Garden Committee, ...	55 96	
Committee on Publication and Discussion,	120 00	
Benjamin B. Davis Fund, ...	583 00	
Insurance, ...	815 00	
Forestry Congress, ...	13 70	
Cash for balance to new account for 1886,	4,273 91	
		$32,953 09

ASSETS.

Real Estate, Furniture, and Exhibition Ware, . .		$256,585 56
Library, last year, ...	$23,646 12	
Added this year, ...	1,000 00	
		$24,646 12
H. H. Hunnewell Rhododendron Prize Bonds, viz.:		
1 Bond C. B. & Q. R. R. for $1,000 and 1 for $500, ...		1,500 00
Sinking Fund Bonds, viz.:		
13 Bonds Burl. & Miss. R. R. in Neb. for $1,000 each, ...		11,656 81
7 Bonds C. B. & Q. R. R. for $1,000 each, ...		6,476 75
Benjamin B. Davis Grape Prize Bond, viz.:		
1 Bond Illinois Grand Trunk R. R. for $500, ...		583 00
Stereotype Plates, and Copies of History,		299 50
Cash on hand December 31, 1885, .		4,273 91
		$306,021 65

LIABILITIES.

Mortgage Debt, bearing interest at $4\frac{1}{4}$ per cent per annum, due October 1, 1888,	$60,000 00	
Loan, without Interest, payable to Harvard College in 1899, ...	12,000 00	
		72,000 00
Surplus, ...		$234,021 65

MEMBERS.

Number of Life Members, by last printed List,		609	
Added during the year,	16		
Commuted from Annual,	3		
	—	19	
		—	628
Deceased during the year or now first reported,			39
			589
Number of Annual Members, by last printed List,	279		
Added during the year,	14		
	—	293	
Deceased during the year or now first reported,	7		
Discontinued,	15		
Commuted,	3		
	—	25	
		—	268
Total Membership,			857

INCOME FROM MEMBERSHIP.

15	Life Members,	$450 00	
14	Annual Members,	140 00	
202	Assessments,	404 00	
4	Commutations (including 1 deferred from 1884),	80 00	
			$1,074 00

The Finance Committee, having audited the accounts of the undersigned, have made and subscribed to, on a book kept for that purpose, the following report:—

The Massachusetts Horticultural Society

In account with George W. Fowle, *Treasurer*,

Credit:—

By balance in Treasury, December 31, 1884,	$6,795 78	
" total income during the year 1885,	26,157 31	
		$32,953 09

Contra Debit:—

To cash paid out during the year 1885,	$28,679 18	
" balance to new account, . .	4,273 91	
		$32,953 09

We have examined the above account and find it correct, and the balance of cash on hand, forty-two hundred and seventy-three $\frac{91}{100}$ dollars.

(Signed) H. H. Hunnewell,
Frederick L. Ames,
H. P. Walcott,
Finance Committee.

Boston, Feb. 5, 1886.

The sum of $11,233 of the surplus funds has been invested in railroad bonds, to increase the Sinking Fund for the reduction of the mortgage debt, the Fund now amounting to $18,133. The sum of $500, received from the estate of Benjamin B. Davis, has also been invested in a railroad bond.

The amount of interest paid by the Society has been decreased from $3,860, paid in 1882, to $1,840 in 1885.

The receipts from the Halls during the year have been less than in previous years,— partially owing to reduction of rents in competition with other halls.

The receipts from the Annual Exhibitions show an increased income, but the accommodations of the halls are insufficient for the future enlargement of these exhibitions.

GEORGE W. FOWLE,
Treasurer.

Boston, Feb. 5, 1886.

Dr. *Massachusetts Horticultural Society, in account with the Proprietors of the Cemetery of Mt. Auburn.* **Cr.**

For Sales and Improvements within the Cemetery for the year ending December 31, 1885.

To cost of filling up and improving land at Mt. Auburn for the year ending December 31, 1885; the Massachusetts Horticultural Society being charged with their proportion of the same :—		
Vesper Avenue,	$1,529 87	
Glen Avenue,	1,911 88	
Crystal to Birch Avenues,	662 38	
	$4,104 13	
One quarter of $4,104.13 is,	$1,026 03	
Balance due Massachusetts Horticultural Society,	2,713 53	
		$3,739 56

By Sales in January,	$489 50
" " " February,	149 75
" " " March,	540 62
" " " April,	1,830 00
" " " May,	2,123 75
" " " June,	3,858 37
" " " July,	1,270 00
" " " August,	374 75
" " " September,	430 00
" " " October,	1,228 75
" " " November,	3,384 75
" " " December,	200 00
	$15,880 24
Net amount received from Receiving Tomb,	493 00
	$16,373 24
Less graves repurchased,	15 00
	$16,358 24
Deduct for Annual Expenses,	1,400 00
	$14,958 24
Mass. Horticultural Society's one-quarter part of $14,958.24 is,	$3,739 56

E. & O. E.

December 31, 1885.

H. B. MACKINTOSH, *Treasurer.*

MASSACHUSETTS HORTICULTURAL SOCIETY,

To the PROPRIETORS OF THE CEMETERY OF MOUNT AUBURN, *Dr.*

For one-fourth part of the following expenditures for grading new lands for sale during the year 1885:—

Vesper Avenue.		
507¼ days, men,	$1,014 50	
147¼ " man and horse,	515 37	
		$1,529 87
Glen Avenue.		
581 days, men,	$1,162 00	
214¼ " man and horse,	749 88	
		$1,911 88
Crystal to Birch Avenues.		
225¾ days, men,	$451 50	
60¼ " man and horse,	210 88	
		$662 38
		$4,104 13
One-fourth part of $4,104.13 is,		$1,026 03

J. W. LOVERING,

Superintendent.

MOUNT AUBURN, Dec. 31, 1885.

I certify the foregoing to be a true copy of improvements for the year 1885, rendered by the Superintendent.

H. B. MACKINTOSH,

Treasurer.

Massachusetts Horticultural Society.

OFFICERS AND STANDING COMMITTEES FOR 1886.

President.

HENRY P. WALCOTT, of Cambridge.

Vice-Presidents.

JOHN CUMMINGS, of Woburn.
BENJAMIN G. SMITH, of Cambridge.
CHARLES H. B. BRECK, of Brighton.
FREDERICK L. AMES, of North Easton.

Treasurer and Superintendent of the Building.

GEORGE W. FOWLE, of Boston.

Secretary and Librarian.

ROBERT MANNING, of Salem.*

Recording Secretary.

ROBERT MANNING, of Salem.

Professor of Botany and Vegetable Physiology.

JOHN ROBINSON, of Salem.

Professor of Entomology.

SAMUEL H. SCUDDER, of Cambridge.

Standing Committees.

Executive.

THE PRESIDENT, HENRY P. WALCOTT, CHAIRMAN.
THE CHAIRMAN OF FINANCE COMMITTEE, H. H. HUNNEWELL; MARSHALL P. WILDER, WILLIAM C. STRONG, F. L. AMES, CHARLES H. B. BRECK, HENRY WELD FULLER, CHARLES S. SARGENT, WILLIAM H. SPOONER.

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*Communications for the Secretary, on the business of the Society, should be addressed to him at Horticultural Hall, Boston.

Finance.

H. HOLLIS HUNNEWELL, CHAIRMAN.

HENRY P. WALCOTT. F. L. AMES.

Publication and Discussion.

O. B. HADWEN, CHAIRMAN.

FRANCIS H. APPLETON. WILLIAM H. HUNT.

Establishing Prizes.

CHAIRMAN OF COMMITTEE ON FRUITS, CHAIRMAN.
CHAIRMEN OF COMMITTEES ON FLOWERS, VEGETABLES, AND GARDENS, *EX OFFICIIS;* C. M. ATKINSON, EDWARD L. BEARD, JACKSON DAWSON.

Library.

WILLIAM E. ENDICOTT, CHAIRMAN.
THE PROFESSOR OF BOTANY AND VEGETABLE PHYSIOLOGY AND THE PROFESSOR OF ENTOMOLOGY, *EX OFFICIIS;*

J. D. W. FRENCH. NATHANIEL T. KIDDER.
FRANCIS H. APPLETON. GEORGE W. HUMPHREY.

Gardens.

JOHN G. BARKER, CHAIRMAN.
CHAIRMEN OF COMMITTEES ON FRUITS, FLOWERS, AND VEGETABLES, *EX OFFICIIS;*
CHARLES W. ROSS, BENJAMIN G. SMITH, HENRY W. WILSON.

Fruit.

E. W. WOOD, CHAIRMAN.

BENJAMIN G. SMITH. J. W. MANNING. WARREN FENNO.
CHARLES F. CURTIS. O. B. HADWEN. E. P. RICHARDSON.

Plants and Flowers.

JOSEPH H. WOODFORD, CHAIRMAN.

F. L. HARRIS. EDWIN FEWKES. WARREN H. MANNING.
DAVID ALLAN. DENYS ZIRNGIEBEL. ROBERT T. JACKSON.

Vegetables.

CHARLES N. BRACKETT, CHAIRMAN.

SAMUEL HARTWELL. WARREN HEUSTIS. JAMES COMLEY.
CEPHAS H. BRACKETT. GEORGE HILL. P. G. HANSON

Committee of Arrangements.

EDWARD L. BEARD, CHAIRMAN
CHAIRMEN OF COMMITTEES ON FRUITS, FLOWERS, VEGETABLES, AND GARDENS, *EX OFFICIIS;*

WARREN HEUSTIS. CHARLES L. FOWLE.

MEMBERS FOR LIFE.

Change of residence, or any inaccuracies, should be promptly reported to the Secretary.

Adams, George E., Medford.
Albro, Charles, Taunton.
Alger, R. F., Becket.
Allan, David, Watertown.
Ames, Frank M., Canton.
Ames, Frederick L., North Easton.
Ames, George, Boston.
Ames, Preston Adams, Hingham.
Amory, Charles, Boston.
Amory, Frederick, Boston.
Anderson, Alexander, Hingham.
Andrews, Charles L., Milton.
Andrews, Frank W., Boston.
Andros, Milton, Brookline.
Appleton, Edward, Reading.
Appleton, Francis H., Peabody.
Appleton, William S., Boston.
Atkins, Elisha, Boston.
Avery, Edward, Boston.
Ayling, Isaac, Waltham.

Bacon, George, Brookline.
Bailey, Edwin C., Concord, N. H.
Baker, William E., Boston.
Bancroft, John C., Boston.
Banfield, Francis L., Boston.
Barnard, James M., Malden.
Barnard, Robert M., Everett.
Barnes, Walter S., Somerville.
Barnes, William H., Boston.
Barney, Levi C., Boston.
Barratt, James, Cambridgeport.
Barrett, Edwin S., Concord.
Barrows, Thomas, Dedham.
Bartlett, Edmund, Newburyport.
Bates, Amos, Hingham.
Bates, Caleb, Kingston.
Bayley, John P., Boston.
Beal, Alexander, Dorchester.
Beckford, Daniel R., Jr., Dedham.
Bell, Joseph H., Quincy.
Bemis, Emery, Cambridge.
Berry, James, Brookline.
Bickford, Weare D., Newtonville.
Birchard, Charles, Framingham.
Black, James W., Cambridge.
Blagg, Samuel, Newbern, N. C.
Blake, Arthur W., Brookline.
Blakemore, John E., Roslindale.
Blanchard, John W., Dorchester.
Blaney, Henry, Boston.
Blinn, Richard D., Chicago, Ill.
Bliss, William, Springfield.
Bocher, Ferdinand, Cambridge.
Bockus, Charles E., Dorchester.
Bond, George W., West Roxbury.
Borland, John N., New London, Ct.
Botume, John, Wyoming.
Bouvé, Thomas T., Boston.
Bowditch, Azell C., Somerville.
Bowditch, J. Ingersoll, Jamaica Plain.
Bowditch, William E., Roxbury.
Bowker, William H., West Newton.
Brackett, Cephas H., Brighton.
Brackett, Charles N., Newton.
Bradish, Levi J., Boston.
Bragg, Samuel A. B., Dorchester.
Breed, Henry A., Lynn.
Bresee, Albert, Hubbardton, Vt.
Brewer, John Reed, Boston.
Brewer, Otis, Jamaica Plain.
Brigham, William T., Boston.
Brimmer, Martin, Boston.

Brintnall, Benjamin, Charlestown.
Brooks, Francis, West Medford.
Brown, Alfred S., Jamaica Plain.
Brown, Charles E., Yarmouth, N.S.
Brown, Edward, J., Weston.
Brown, G. Barnard, Boston.
Brown, George Bruce, Framingham.
Brown, Jacob, Woburn.
Brownell, E. S., Essex Junction, Vt.
Bruce, Nathaniel F., Stoneham.
Bullard, John R., Dedham.
Bullard, William S., Boston.
Burnett, Joseph, Southborough.
Burnham, Thomas O. H. P., Boston.
Burr, Fearing, Hingham.
Burr, Matthew H., Hingham.
Buswell, Edwin W., New York, N.Y.
Buswell, Frank E., New York, N.Y.
Butler, Aaron, Wakefield.
Butler, Edward K., Jamaica Plain.
Butterfield, William P., East Lexington.

Cadness, John, Flushing, N.Y.
Cains, William, South Boston.
Calder, Augustus P., Boston.
Capen, John, Boston.
Carlton, Samuel A., Boston.
Carruth, Charles, Boston.
Carter, Miss Sabra, Wilmington.
Cartwright, George, Dedham.
Chadbourne, Marshall W., Watertown.
Chamberlain, Chauncey W., Boston.
Chapin, Nathaniel G., Brookline.
Chapman, Edward, South Framingham.
Chase, Andrew J., Lynn.
Chase, Daniel E., Somerville.
Chase, George B., Boston.
Chase, Hezekiah S., Boston.
Chase, William M., Baltimore, Md.
Cheney, Benjamin P., Boston.
Child, Francis J., Cambridge.
Child, William C., Medford.
Childs, Francis, Charlestown.
Childs, Nathaniel R., Boston.
Choate, Charles F., Cambridge.
Claflin, Henry, Newton.
Claflin, William, Newton.
Clapp, Edward B., Dorchester.
Clapp, E. W., Walpole.
Clapp, James H., Dorchester.
Clapp, William C., Dorchester.
Clark, Benjamin C., Boston.
Clark, Orus, Worcester.
Clark, William S., Amherst.
Clark, W. L., Neponset.
Clarke, Miss Cora H., Jamaica Plain.
Clay, Henry, Dorchester.
Cleary, Lawrence, West Roxbury.
Clement, Asa, Dracut.
Cleveland, Ira, Dedham.
Cobb, Albert A., Brookline.
Coburn, Isaac E., Everett.
Codman, James M., Brookline.
Codman, Ogden, Lincoln.
Coffin, G. Winthrop, West Roxbury.
Coffin, William E., Dorchester.
Converse, Elisha S., Malden.
Converse, Parker L., Woburn.
Coolidge, Joshua, Watertown.
Copeland, Franklin, West Dedham.
Cox, George P., Malden.
Coy, Samuel I., Boston.
Crocker, George O., New Bedford.
Crocker, Uriel, Boston.
Crosby, Josiah, Arlington.
Crowell, Philander, Chelsea.
Crowell, Randall H., Chelsea.
Cummings, John, Woburn.
Curtis, Charles F., Jamaica Plain.
Curtis, George S., Jamaica Plain.
Cushing, Robert M., Boston.

Daggett, Henry C., Boston.
Damon, Samuel G., Arlington.
Dana, Charles B., Brookline.
Darling, Charles K., Boston.
Davenport, Edward, Dorchester.
Davenport, George E , Medford.
Davenport, Henry, Boston.

Davis, Curtis, Cambridgeport.
Dawson, Jackson, Forest Hills.
Deblois, Stephen G., Boston.
Dee, Thomas W., Mount Auburn.
Denny, Clarence H., Boston.
Denny, R. S., Dorchester.
Denton, Eben, Dorchester.
Dewson, Francis A., Newtonville.
Dexter, F. Gordon, Boston.
Dickerman, George H., Somerville.
Dike, Charles C., Stoneham.
Dinsmore, William B., New York, N. Y.
Dorr, George, Dorchester.
Dove, George W. W., Andover.
Durant, William, Boston.
Durfee, Mrs. F. B., Fall River.
Durfee, George B., Fall River.
Dutcher, F. J., Hopedale.

Eaton, Horace, Quincy.
Eldridge, Azariah, Yarmouthport.
Eldridge, E. H., Roxbury.
Ellicott, Joseph P., Boston.
Endicott, William E., Canton.
Eustis, William C., Hyde Park.
Everett, Otis, Boston.
Everett, William, Dorchester.

Fairchild, Charles, Belmont.
Falconer, William, Glencove, N. Y.
Farlow, John S., Newton.
Farlow, Lewis H., Newton.
Farquhar, Robert, Boston.
Faxon, John, Quincy.
Fay, Mrs. Rebekah L., Chelsea.
Fenno, J. Brooks, Boston.
Fewkes, Arthur H., Newton Highlands.
Fewkes, Edwin, Newton Highlands.
Fillebrown, John, Arlington.
Fisher, David, Newport, R. I.
Fisher, James, San Diego, Cal.
Fisher, Warren, Boston.
Flagg, Augustus, Boston
Fleming, Edwin, West Newton.
Fletcher, George V., Belmont.
Fletcher, John W., Chelsea.
Fletcher, J. Henry, Belmont.
Flint, Charles L., Boston.
Flint, David B., Watertown.
Flynt, William N., Monson.
Foster, Francis C., Cambridge.
Foster, John H , Boston.
Fottler, John, Jr., Dorchester.
Fowle, William B., Auburndale.
Freeman, Abraham, Dorchester.
French, Jonathan, Boston.
French, J. D. Williams, Boston.
Fuller, Henry Weld, Roxbury.

Galvin, John, West Roxbury.
Gardner, Henry N., Belmont.
Gardner, John L., Brookline.
Gibbs, Wolcott, Cambridge.
Gillard, William, Boston.
Gilmore, E. W. North Easton.
Gilson, F. Howard, Reading.
Glover, Albert, Boston.
Glover, Joseph B., Boston.
Goddard, A. Warren, Brookline.
Goddard, Mrs. Mary T., Newton.
Goodell, L. W., Amherst.
Gorham, James L., Jamaica Plain.
Gould, Francis, Arlington.
Gould, Samuel, Boston.
Gray, James, Wellesley.
Gregory, James J. H., Marblehead.
Greig, George, Newton.
Groom, Thomas, Dorchester.
Grundel, Hermann, Dorchester.
Guild, J. Anson, Brookline.

Hadwen, Obadiah B., Worcester.
Hall, Edwin A., Cambridgeport.
Hall, George A., Chelsea.
Hall, George R., Fort George, Fla.
Hall, John R., Roxbury.
Hall, Lewis, Cambridge.
Hall, Stephen A., Revere.
Hall, William F., Brookline.
Halliday, William H., South Boston.

Hammond, Gardner G., Boston.
Hammond, Samuel, Boston.
Hanson, P. G., Woburn.
Harding, Charles L., Cambridge.
Harding, George W., Boston.
Harding, Lewis B., Boston.
Harding, William C., Stamford, Ct.
Hardy, F. D., Jr., Cambridgeport.
Harrington, Leonard R., Salem.
Harris, Charles, Cambridge.
Hart, William T., Boston.
Hastings, Levi W., Brookline.
Hathaway, Seth W., Marblehead.
Haughton, James, Boston.
Haven, Alfred W., Portsmouth, N.H.
Hayes, Daniel F., Exeter, N. H.
Hayes, Francis B., Lexington.
Hazeltine, Hazen, Boston.
Head, Charles D., Brookline.
Henshaw, Joseph P. B., Boston.
Heywood, George, Concord.
Hilbourn, A. J., Chelsea.
Hill, George, Arlington.
Hill, John, Stoneham.
Hilton, William, Boston.
Hitchings, E. H., Boston.
Hoar, Samuel, Concord.
Hodgkins, John E., Chelsea.
Hollis, George M., Grantville.
Hollis, John W., Allston.
Holt, Mrs. Stephen A., Winchester.
Hooper, Robert C., Boston.
Hooper, Thomas, Bridgewater.
Horner, Mrs. Charlotte N. S., Georgetown.
Hovey, Charles H., Cambridgeport.
Hovey, Charles M., Cambridgeport.
Hovey, John C., Cambridgeport.
Hovey, Stillman S., Woburn.
Howe, George, Boston.
Hubbard, Charles T., Weston.
Hubbard, Gardner G., Cambridge.
Hubbard, James C., Everett.
Humphrey, F. J., Dorchester.
Humphrey, George W., Dedham.
Hunneman, Joseph H., Boston.
Hunnewell, Arthur, Wellesley.
Hunnewell, H. Hollis, Wellesley.
Hunnewell, Walter, Wellesley.
Hunt, Franklin, Boston.
Hunt, Moses, Charlestown.
Hunt, William H., Concord.
Hyde, James F. C., Newton.

Inches, Herman B., Boston.

Jackson, Abraham, Boston.
Jackson, Robert T., Dorchester.
Janvrin, William S., Revere.
Jeffries, John, Boston.
Jenks, Charles W., Boston.
Joyce, Mrs. E. S., Medford.

Kakas, Edward, Medford.
Kendall, D. S., Woodstock, Ont.
Kendall, Edward, Cambridgeport.
Kendall, Joseph R., Oakland, Cal.
Kendrick, Mrs. H. P., Allston.
Kennard, Charles W., Boston.
Kennedy, George G., Milton.
Kent, John, Charlestown.
Keyes, E. W., Denver, Col.
Keyes, George, Concord.
Kidder, Henry P., Boston.
Kidder, Nathaniel T., Boston.
Kimball, A. P., Boston.
King, Franklin, Dorchester.
Kingman, Abner A., Brookline.
Kingman, C. D., Middleborough.
Kinney, John M., Boston.
Kinsley, Lyman, Cambridgeport.
Kittredge, E. A., Boston.

Lamb, Thomas, Boston.
Lancaster, Charles B., Newton.
Lane, John, East Bridgewater.
Lawrence, Amos A., Boston.
Lawrence, James, Boston.
Lawrence, John, Boston.
Lee, Henry, Boston.
Leeson, Joseph R., Newton Centre.
Lemme, Frederick, Arlington.
Leuchars, Robert B., Boston.

Lewis, A. S., Framingham.
Lewis, William G., Framingham.
Lincoln, George, Hingham.
Locke, William H., Belmont.
Lockwood, Rhodes, Boston.
Lodge, G. Henry, Boston.
Loftus, John P., North Easton.
Loomis, Jason B., Boston.
Lord, George C., Newton.
Loring, Caleb W., Beverly Farms.
Loring, George B., Salem.
Lovett, George L., West Newton.
Low, Ariel, Roxbury.
Lowder, John, Watertown.
Lowell, Augustus, Boston.
Luke, Elijah H., Cambridgeport.
Lumb, William, Boston.
Lunt, Charles H., Jamaica Plain.
Lyman, Theodore, Brookline.
Lyon, Henry, Charlestown.

Mahoney, John, Boston.
Mann, James F., Ipswich.
Mann, Jonathan, Milton.
Manning, Jacob W., Reading.
Manning, Mrs. Lydia B., Reading.
Manning, Robert, Salem.
Manning, Warren H., Reading.
Marshall, Frederick, Everett.
Martin, Darius A., Chelsea.
Martin, John S., Roxbury.
Matthews, Nathan, Boston.
McCarty, Timothy, Providence, R.I.
McClure, John, Revere.
Melvin, James C., West Newton.
Merriam, Herbert, Weston.
Merriam, M. H., Lexington.
Merrifield, William T., Worcester.
Metivier, James, Cambridge.
Minton, James, Boston.
Moore, John B., Concord.
Moore, John H., Concord.
Morrill, Joseph, Jr., Roxbury.
Morse, Samuel F., Boston.
Morse, William A., Boston.
Motley, Thomas, Forest Hills.
Mudge, George A., Portsmouth, N. H.
Munroe, Otis, Boston.

Needham, Daniel, Groton.
Nevins, David, Framingham.
Newhall, George, Dorchester.
Newman, J. R., Winchester.
Newton, Rev. William W., Pittsfield.
Nickerson, Albert W., Marion.
Nickerson, George A., Dedham.
Norton, Charles W., Allston.
Nourse, Benjamin F., Boston.
Nourse, Benjamin F., Cambridgeport.

Oakman, Hiram A., North Marshfield.
Osgood, James Ripley, Boston.
Oxnard, George D., Boston.

Packer, Charles H., Boston.
Page, Thomas, Boston.
Paige, Clifton H., Boston.
Parker, Augustus, Roxbury.
Parker, Mrs. Mary, Wakefield.
Parkman, Francis, Jamaica Plain.
Partridge, Henry, Dunkirk, N.Y.
Partridge, Horace, Cambridge.
Paul, Alfred W., Dighton.
Peabody, John E., Salem.
Pearce, John, West Roxbury.
Peck, O. H., Denver, Col.
Peck, W. G., Arlington.
Peirce, Silas, Boston.
Penniman, A. P., Waltham.
Perkins, Augustus T., Boston.
Perkins, Edward N., Jamaica Plain.
Perkins, William P., Wayland.
Perry, George W., Malden.
Philbrick, William D., Newton Centre.
Pierce, Dean, Brookline.
Pierce, George W., Everett.
Pierce, Henry L., Boston.

Pierce, Samuel B., Dorchester.
Poole, Benjamin C., Chelsea.
Poor, John R., Somerville.
Potter, Joseph S., Arlington.
Prang, Louis, Roxbury.
Pratt, Laban, Dorchester.
Pratt, Lucius G., West Newton.
Pratt, Robert M., Boston.
Pratt, William, Winchester.
Pray, Mark W., Beachmont.
Prescott, Eben C., Boston.
Prescott, William G., Boston.
Prescott, William G., Quincy.
Pringle, Cyrus G., Charlotte, Vt.
Proctor, Thomas P., West Roxbury.
Prouty, Gardner, Littleton.
Pulsifer, Royal M., Auburndale.
Putnam, Joshua H., Brookline.

Ramsay, A. H., Cambridge.
Rand, Miss E. L., Newton Highlands.
Rand, Oliver J., Cambridgeport.
Rawson, Warren W., Arlington.
Ray, James F., Franklin.
Ray, James P., Franklin.
Ray, Joseph G., Franklin.
Reed, George W., Boston.
Richards, John J., Boston.
Richardson, Charles E., Cambridgeport.
Richardson, George C., Boston.
Rinn, J. Ph., Boston.
Robbins, I. Gilbert, Dorchester.
Robbins, Nathan, Arlington.
Robeson, William R., Boston.
Robinson, John, Salem.
Robinson, Joseph B., Allston.
Rogers, John H., Boston.
Ross, Henry, Newtonville.
Ross, M. Denman, Forest Hills.
Ross, Waldo O., Boston.
Ruddick, Dr. W. H., South Boston.
Russell, George, Woburn.
Russell, John E., Leicester.
Russell, Walter, Arlington.

Sampson, George R., New York, N.Y.
Sanborn, Amos C., Cambridgeport.
Sanford, Oliver S., Hyde Park.
Sargent, Charles S., Brookline.
Sargent, John O., Lenox Furnace.
Saville, Richard L., Brookline.
Sawtelle, Eli A., Boston.
Sawyer, Timothy T., Charlestown.
Scott, Charles, Newton.
Scudder, Charles W., Brookline.
Sears, J. Montgomery, Boston.
Seaver, Nathaniel, East Boston.
Seaver, Robert, Jamaica Plain,
Shaw, Christopher C., Milford, N.H.
Shaw, S. P., Cambridge.
Sheldon, Oliver S., Milton.
Shimmin, Charles F., Boston.
Shorey, John L., Lynn.
Skinner, Francis, Boston.
Smith, Benjamin G., Cambridge.
Smith, Calvin W., Grantville.
Smith, Charles H., Jamaica Plain.
Smith, Chauncey, Cambridge.
Smith, Edward N., San Francisco.
Smith, George O., Boston.
Smith, James H., Needham.
Smith, Whitman B., Roxbury.
Snow, Eben, Cambridge.
Snow, Miss Salome H., Brunswick, Me.
Sparhawk, Edward C., Brighton.
Spaulding, Edward, Newton.
Spaulding, Mahlon D., Boston.
Speare, Alden, Newton Centre.
Spencer, Alfred W., Boston.
Springall, George, Malden.
Springer, John, Sterling.
Stetson, Nahum, Bridgewater.
Stewart, William J., Winchester.
Stickney, Rufus B., Somerville.
Stimpson, George, New York, N.Y.
Stimpson, H. H., Cambridge.
Stone, Amos, Everett.
Stone, George F., Newton.
Stone, Phineas J., Charlestown.
Story, E. Augustus, Brighton.

Strong, William C., Newton Highlands.
Sturgis, John H., Brookline.
Sturgis, Russell, Jr., Boston.
Sturtevant, E. Lewis, Geneva, N.Y.
Surette, Louis A., Concord.
Swain, Charles D., Roxbury.

Taft, John B., Cambridge.
Tappan, Charles, Boston.
Taylor, Horace B., Boston.
Thayer, Henry, North Cambridge.
Thurlow, Thomas C., Newburyport.
Tidd, Marshall M., Woburn.
Tilton, Stephen W., Roxbury.
Todd, John, Hingham.
Tolman, Benjamin, Concord.
Tolman, Miss Harriet S., Boston.
Torrey, Everett, Charlestown.
Turner, John M., Dorchester.
Turner, Roswell W., Boston.
Turner, Royal W., Randolph.

Underwood, Guy C., Roxbury.
Underwood, William J., Belmont.

Vass, William J., Brookline.
Vinal, Miss Mary L., Somerville.
Vose, Benjamin C., Hyde Park.

Wainwright, William L., Braintree.
Wakefield, E. H., Cambridge.
Walcott, Edward, Pawtucket, R. I.
Walcott, Henry P., Cambridge.
Wales, George O., Braintree.
Walker, Edward C. R., Dedham.
Walker, Samuel A., Dedham.
Walker, Theophilus W., Waltham.
Walley, Mrs. W. P., Boston.
Ward, John, Newton.
Wardwell, William H., Newton Centre.
Ware, Benjamin P., Beach Bluff.
Warren, George W., Boston.
Washburn, Andrew, Hyde Park.
Wason, Elbridge, Brookline.
Waters, Edwin F., Newton Centre.
Waters, George F., Boston.
Watson, Thomas A., East Braintree.
Watts, Isaac, Waverly.
Webber, Aaron D., Boston.
Weld, Aaron D., West Roxbury.
Weld, George W., Newport, R. I.
Weld, Dr. Moses W., Boston.
Weld, Richard H., Boston.
Weld, William G., Boston.
West, Mrs. Maria L., Neponset.
Weston, Leonard W., Lincoln.
Weston, Seth, Revere.
Wheelwright, A. C., Boston.
Whipple, John A., Boston.
Whitcomb, William B., Medford.
White, Benjamin C., Boston.
White, Edward A., Boston.
White, Francis A., Brookline.
Whitely, Edward, Cambridge.
Whiting, Nathaniel, Brookline.
Whittle, George W., Somerville.
Whytal, Thomas G., New York, N.Y.
Wilbur, George B., West Newton.
Wilcutt, Levi L., West Roxbury.
Wilder, Edward Baker, Dorchester.
Wilder, Henry A., Malden.
Wilder, Marshall P., Dorchester.
Willard, E. W., Newport, R. I.
Williams, Aaron D., Boston.
Williams, Benjamin B., Boston.
Williams, Philander, Taunton.
Willis, George W., Chelsea.
Willis, Joshua C., Boston.
Wilson, Henry W., Boston.
Wilson, William Power, Boston.
Woerd, Charles V., Waltham.
Woerd, Charles V., Jr., Waltham.
Wood, Luke H., Marlborough.
Wood, R. W., Jamaica Plain.
Wood, William K., West Newton.
Woods, Henry, Boston.
Woodward, Royal, Brookline.
Wright, George C., West Acton.
Wrisley, Frank, New York, N. Y.

ANNUAL MEMBERS.

Abbot, Samuel L., Boston.
Allen, Andrew F., Arlington.
Allen, Calvin, Roxbury.
Allen, C. L., Garden City, N. Y.
Ames, R. W., Boston.
Anderson, Charles J., Longwood.
Atkinson, Charles M., Brookline.
Atkinson, Edward, Brookline.
Atkinson, William B., Newburyport.

Bacon, Augustus, Roxbury.
Bacon, William, Roxbury.
Badlam, William H., Dorchester.
Barber, J. Wesley, Newton.
Bard, James, Framingham.
Barker, John G., Lynn.
Batchelder, G. W., St. Albans, Vt.
Beard, Edward L., Cambridge.
Beebe, J. Arthur, Boston.
Beer, Carl, New York, N. Y.
Bird, John L., Dorchester.
Bliss, Benjamin K., Boston.
Bock, William A., North Cambridge.
Bolles, Matthew, Boston.
Bolles, William P., Roxbury.
Bolton, John B., Somerville.
Boott, William, Boston.
Bottomly, Robert, Astoria, N. Y.
Bowditch, E. F., Framingham.
Bowditch, James H., Brookline.
Bowker, Albert, East Boston.
Boyden, Clarence F., Taunton.
Bradlee, John T., Boston.
Breck, Charles H., Brighton.
Breck, Charles H. B., Brighton.
Brooks, George, Brookline.
Brown, Atherton T., Roxbury.
Brown, David H., West Medford.
Brown, Jonathan, Jr., Somerville.
Brown, Joseph T., Boston.
Bullard, George B., Hingham.
Burley, Edward, Beverly.
Butler, Edward, Wellesley.

Carter, Miss Maria E., Woburn.
Cartwright, James, Wellesley.
Chaffin, John C., Newton.
Chapin, Gardner S., Chicago, Ill.
Chase, Joseph S., Malden.
Cheney, Amos P., South Natick.
Clark, James W., Framingham.
Clark, Joseph, Manchester.
Clark, Joseph W., Dedham.
Clark, Theodore M., Newtonville.
Collins, Frank S., Malden.
Comley, James, Lexington.
Crafts, William A., Boston.
Crosby, J. Allen, Jamaica Plain.
Cruickshanks, J. T., Natick.
Curtis, Daniel T., Milton Lower Mills.
Curtis, Joseph H., Boston.

Davenport, A. M., Watertown.
Davis, Frederick, Newton.
Davis, Thomas M., Cambridgeport.
DeMar, John A., Brighton.
Ditson, Oliver, Boston.
Dolbear, Mrs. Alice J., College Hill.
Doogue, William, Boston.
Doran, Enoch E., Brookline.
Doyle, William E., East Cambridge.
Duffley, Daniel, Brookline.
Dupee, James A., Brookline.

Eaton, Jacob, Cambridgeport.
Edgar, William, Newtonville.

Farrier, Mrs. Cynthia, Stoneham.
Faxon, Edwin, Jamaica Plain.
Faxon, Marshall B., Melrose.
Felton, Arthur W., West Newton.
Fenno, Warren, Revere.
Fergusson, Thomas M., Philadelphia, Pa.
Fisher, Sewall, Framingham.
Fletcher, Edwin, Acton.
Forbes, William H., Jamaica Plain.
Foster, Joshua T., Medford.
Fowle, Charles L., Dorchester.
Fowle, George W., Jamaica Plain.
French, William E., Boston.
Frohock, Roscoe R., Malden.
Frost, Edward, Littleton.
Frost, George, West Newton.
Frost, Stiles, Newtonville.
Fuller, T. Otis, Needham.

Gane, Henry A., West Newton.
Gardiner, Claudius B., Newburyport.
Gardner, John, Boston.
Gibbon, Mrs. James A., Dorchester.
Gifford, Stephen N., Duxbury.
Gilbert, Samuel, Boston.
Gill, Mrs. E. M., Medford.
Gleason, Herbert, Malden.
Godbold, Gustavus A., Chelsea.
Goddard, Thomas, Boston.
Goodwin, Lester, Brighton.
Gould, William P., Jamaica Plain.
Grant, Charles E., Concord.
Gray, Howard, Dorchester.
Gray, William, Jr., Dorchester.
Gray, William, 3rd, Dorchester.
Greene, Malcolm C., Dorchester.
Grew, Henry, Hyde Park.
Grover, William O., Boston.
Guerineau, Louis, Cambridge.

Hall, William T., Revere.
Hamlin, Delwin A., Allston.
Harris, Miss Ellen M., Jamaica Plain.
Harris Frederick L., South Natick.
Hartwell, Samuel, Lincoln.
Harwood, George S., Newton.
Hatch, Samuel, Boston.
Hayes, John L., Cambridge.
Hazelton, H. L., Hingham.
Hersey, Alfred H., Hingham.
Hersey, Edmund, Hingham.
Heustis, Warren, Belmont.
Hewins, James, Medfield.
Hews, Albert H., North Cambridge.
Hill, Benjamin D., Peabody.
Hill, Edwin S., Hyde Park.
Hill, J. Willard, Belmont.
Hill, Miss Katie A., Lowell.
Hinckley, Mrs. David F., Everett.
Howe, Rufus, Marlborough.
Hunt, Henry C., Newton.

Ireland, George W., Somerville.

Jameson, G. W., East Lexington.
Johnson, J. Frank, Boston.
Jones, Moses, Brookline.
Jordan, Samuel, Yarmouth.
Judkins, Rev. B., West Dedham.

Kelley, George B., Jamaica Plain.
Kendall, Jonas, Framingham.
Kenrick, Miss Anna C., Newton.

Lamprell, Simon, Marblehead.
Lang, John H. B., Boston.
Langmaid, Mrs. Mary, Somerville.
Langworthy, Rev. Isaac P., Chelsea.
Lee, Charles J., Dorchester.
Lee, Francis H., Salem.
Livermore, Miss Maria, Mount Auburn.
Loring, Charles G., Boston.
Loring, John A., Boston.
Lothrop, David W., West Medford.
Lothrop, H. A., Sharon.

Lothrop, Thornton K., Boston.
Lowell, John, Newton.

Manda, William A., Cambridge.
Marcou, Mrs. J., Cambridge.
Markoe, George F. H., Roxbury.
Martin, William J., Milton.
May, F. W. G., Boston.
McDermott, Andrew, Roxbury.
McIntosh, Aaron S., Roxbury.
McLaren, Anthony, Forest Hills.
McMillan, Robert, Whitinsville.
Meriam, Dr. Horatio C., Salem.
Merrill, J. Warren, Cambridgeport.
Merrill, S. A., Wollaston.
Meston, Alexander, Andover.
Mills, William, Somerville.
Minton, Peter J., Forest Hills.
Morandi, Francis, Malden.
Morandi, Francis W., Malden.
Morton, James H., Mount Hope.
Murray, Daniel D., Brookline.
Muzzey, Rev. Artemas B., Cambridge.

Nelson, Mrs. Thomas L., Worcester.
Nightingale, Rev. Crawford, Dorchester.
Norton, Michael H., Boston.
Norton, Patrick, Boston.

O'Brien. James, Jamaica Plain.

Park, William D., Boston.
Parker, George A., Halifax.
Parker, John, Boston.
Patterson, James, Cambridge.
Payson, Samuel R., Boston.
Peirce, George H., Concord.
Petremant, Robert, Roxbury.
Phillips, Nathaniel, Dorchester.
Pierce, Samuel H., Lincoln.
Plimpton, Willard P., West Newton.
Power, Charles J., South Framingham.
Pratt, Mrs. Mary L., Hingham.
Prince, Thomas, Roxbury.
Purdie, George A., Wellesley Hills.
Putnam, Charles A., Salem.
Putnam, Henry W., Salem.

Randall, Macey, Sharon.
Richards, John S., Brookline.
Richardson, E. P., Lawrence.
Richardson, Horace, Framingham.
Richardson, Spencer W., Boston.
Ridler, Charles E., Boston.
Roberts, Edward, Hyde Park.
Robinson, William, North Easton.
Ross, Charles W., Newtonville.

Safford, Nathaniel F., Milton.
Saunders, Miss Mary T., Salem.
Saville, George, Quincy.
Sawtell, J. M., Fitchburg.
Schmitt, Georg A., Wellesley.
Scott, Augustus E., Lexington.
Scott, George H., Allston.
Scudder, Samuel H., Cambridge.
Shattuck, Frederick R., Roxbury.
Shedd, Abraham B., Lexington.
Shedd, Arthur B., Chicago, Ill.
Sheppard, Edwin, Lowell.
Sheppard, S. A. D., Newton.
Snow, Eugene A., Melrose.
Southworth, Edward, Quincy.
Spooner, William H., Jamaica Plain.
Squire, John P., Arlington.
Stearns, Charles H., Brookline.
Stevenson, Hamilton, Woburn.
Stone, Samuel G., Charlestown.
Storer, Charles, Natick.
Story, Miss Sarah W., Brighton.
Strahan, Thomas, Chelsea.
Sullivan, Julius L. D., Somerville.
Swan, Charles W., Boston.

Tailby, Joseph, Wellesley.
Talbot, Josiah W., Norwood.
Temple, Felker L., Somerville.
Terwilliger, S. F., Saratoga Springs, N. Y.
Tillinghast, Joseph, New Bedford.

Tobey, Miss M. B., Brookline.
Tobey, S. Edwin, Boston.
Torrey, Bradford, Boston.
Trautman, Martin, Boston.
Turner, Nathaniel W., Boston.

Van der Veur, P. W., New York, N. Y.
Vaughan, J. C., Chicago, Ill.

Walker, Charles H., Chelsea.
Walker, Joseph T., Watertown, N. Y.
Walker, William P., Somerville.
Waterer, Hosea, South Natick.
Webster, John, Salem.
Weld, Christopher Minot, Jamaica Plain.
Weld, Francis M., Jamaica Plain.
Wellington, Miss C., East Lexington.
Wells, Benjamin T., Newton.
Weston, Mrs. L. P., Danvers.
Wheatland, Henry, Salem.
White, Nelson B., Norwood.
Whitney, Joel, Winchester.
Whiton, Starkes, Hingham Centre.
Wilde, Hiram, Randolph.
Wilmarth, Henry D., Jamaica Plain.
Wilson, B. Osgood, Watertown.
Wilson, George W., Malden.
Wiswall, Henry M., Watertown.
Withington, H. H., Jamaica Plain.
Wolcott, Mrs. Henrietta L. T., Boston.
Wood, Mrs. Anna D., West Newton.
Wood, E. W West Newton.
Woodford, Joseph H., Newton.
Woolson, George C., Passaic, N. J.
Worthington, Roland, Roxbury.
Wright, Daniel, Lowell.

Zirngiebel, Denys, Needham.

EXTRACTS FROM THE CONSTITUTION AND BY-LAWS.

SECTION XXVI.—Life Members.

The payment of thirty dollars shall constitute a Life Membership, and exempt the member from all future assessments; and any member having once paid an admission fee may become a Life Member by the payment of twenty dollars in addition thereto.

SECTION XXVII.—Admission Fee and Annual Assessment.

Every subscription member, before he receives his diploma, or exercises the privileges of a member, shall pay the sum of ten dollars as an admission fee, and shall be subject afterwards to an annual assessment of two dollars.

SECTION XXIX.—Discontinuance of Membership.

Any member who shall neglect for the space of two years to pay his annual assessment shall cease to be a member of the Society, and the Treasurer shall erase his name from the List of Members.

The attention of Annual Members is particularly called to Section XXIX.

HONORARY MEMBERS.

A * denotes the member deceased. Correspondents of the Society and others will confer a favor by communicating to the Secretary information of the decease, change of residence, etc., of Honorary or Corresponding Members.

*Benjamin Abbott, LL.D., Exeter, N. H.
*John Abbott, Brunswick, Me.
*Hon. John Quincy Adams, LL.D., late President of the United States, Quincy.
*Professor Louis Agassiz, Cambridge.
*William T. Aiton, late Curator of the Royal Gardens, Kew, England.
*Thomas Allen, late President of the St. Louis Horticultural Society, St. Louis, Mo., and Pittsfield, Mass.
*Hon. Samuel Appleton, Boston.
*Hon. James Arnold, New Bedford.
*Edward Nathaniel Bancroft, M.D., late President of the Horticultural and Agricultural Society of Jamaica.
*Hon. Philip P. Barbour, Virginia.
*Don Angel Calderon de la Barca, late Spanish Minister at Washington.
*Robert Barclay, Bury Hill, Dorking, Surrey, England.
*James Beekman, New York.
*L'Abbé Berlèse, Paris.
*Nicholas Biddle, Philadelphia.
*Dr. Jacob Bigelow, Boston.
*Mrs. Lucy Bigelow, Medford.
*Le Chevalier Soulange Bodin, late Secrétaire Général de la Société d'Horticulture de Paris.
Hon. George S. Boutwell, Groton.
*Josiah Bradlee, Boston.
*Hon. George N. Briggs, Pittsfield.
*Hon. James Buchanan, late President of the United States, Lancaster, Penn.
*Hon. Jesse Buel, late President of the Albany Horticultural Society, Albany, N.Y.
*Hon. Edmund Burke, late Commissioner of Patents, Washington, D.C.
*Augustin Pyramus de Candolle, Geneva, Switzerland.
*Hon. Horace Capron, late U. S. Commissioner of Agriculture, Washington, D. C.
*Commodore Isaac Chauncey, U. S. Navy, Brooklyn, N. Y.
*Ward Chipman, late Chief-Justice of New Brunswick, St. John.

*Lewis Clapier, Philadelphia.
*Hon. Henry Clay, Lexington, Ky.
H. W. S. Cleveland, Minneapolis, Minn.
*Admiral Sir Isaac Coffin, Bart., England.
*Zaccheus Collins, late President of the Pennsylvania Horticultural Society, Philadelphia.
*Roswell L. Colt, Paterson, N. J.
Caleb Cope, ex-President of the Pennsylvania Horticultural Society, Philadelphia.
*William Coxe, Burlington, N. J.
*John P. Cushing, Watertown.
*Charles W. Dabney, late U. S. Consul, Fayal, Azores.
*Hon. John Davis, LL.D., Boston.
*Sir Humphry Davy, London.
*Gen. Henry Alexander Scammel Dearborn, Roxbury.
*James Dickson, late Vice-President of the Horticultural Society of London.
*Mrs. Dorothy Dix, Boston.
*Capt. Jesse D. Elliot, U. S. Navy.
*Hon. Stephen Elliot, LL.D., Charleston, S. C.
*Hon. Henry L. Ellsworth, late Commissioner of Patents, Washington, D. C.
*Allyn Charles Evanson, late Secretary of the King's County Agricultural Society, St. John, N. B.
*Hon. Edward Everett, LL.D., Boston.
*Hon. Horace Everett, Vermont.
*F. Faldermann, late Curator of the Imperial Botanic Garden, St. Petersburg.
*Hon. Millard Fillmore, late President of the United States, Buffalo, N.Y.
*Dr. F. E. Fischer, late Professor of Botany at the Imperial Botanic Garden, St. Petersburg.
*Hon. Theodore Frelinghuysen, late President of the American Agricultural Society, New Brunswick, New Jersey.
*Joseph Gales, Jr., late Vice-President of the Horticultural Society, Washington, D. C.
*George Gibbs, New York.
*Stephen Girard, Philadelphia.
*Hon. Robert T. Goldsborough, Talbot County, Maryland.
*Ephraim Goodale, South Orrington, Maine.
*Mrs. Rebecca Gore, Waltham.
*Hon. John Greig, late President of the Domestic Horticultural Society, Canandaigua, N.Y.
*Mrs. Mary Griffith, Charlieshope, N. J.
*Gen. William Henry Harrison, late President of the United States, North Bend, Ohio.
*S. P. Hildreth, M.D., Marietta, Ohio.

*Thomas Hopkirk, late President of the Glasgow Horticultural Society.
*David Hosack, M.D., late President of the New York Horticultural Society.
*Lewis Hunt, Huntsburg, Ohio.
*Joseph R. Ingersoll, late President of the Pennsylvania Horticultural Society, Philadelphia.
*Gen. Andrew Jackson, late President of the United States, Nashville, Tenn.
*Mrs. Martha Johonnot, Salem.
*Jared Potter Kirtland, M.D., LL.D., East Rockport, Ohio.
*Thomas Andrew Knight, late President of the Horticultural Society of London.
*Gen. La Fayette, La Grange, France.
*Le Comte De Lasteyrie, late Vice-President of the Horticultural Society of Paris.
L. A. H. Latour, M. P., Montreal, Canada.
*Baron Justus Leibig, Giessen, Germany.
*Prof. John Lindley, late Secretary of the Horticultural Society of London.
*Franklin Litchfield, late U. S. Consul at Puerto Cabello, Venezuela.
*Joshua Longstreth, Philadelphia.
*Nicholas Longworth, Cincinnati, Ohio.
*Jacob Lorillard, late President of the New York Horticultural Society.
*John C. Loudon, London.
*Hon. John A. Lowell, Boston.
*Baron Charles Ferdinand Henry Von Ludwig, late Vice-President of the South African Literary and Scientific Institution, Cape Town, Cape of Good Hope.
*Hon. Theodore Lyman, Brookline.
Col. Theodore Lyman, Brookline.
*Hon. James Madison, late President of the United States, Montpelier, Va.
*Mrs. Charlotte Maryatt, Wimbledon, near London.
Joseph Maxwell, Rio Janeiro.
*D. Smith McCauley, late U. S. Consul-General, Tripoli.
*Hon. Isaac McKim, late President of the Horticultural Society of Maryland, Baltimore.
Rev. James H. Means, Dorchester, Mass.
*James Mease, M.D., Philadelphia.
*Lewis John Mentens, Brussels, Belgium.
*Hon. Charles F. Mercer, Virginia.
*François André Michaux, Paris.
Donald G. Mitchell, New Haven, Conn.
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